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FORMULARY, &c.

LONDON:
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FORMULARY

FOR THE

PREPARATION AND MODE OF EMPLOYING

SEVERAL

NEW REMEDIES;

NAMELY,

MORPHINE, IODINE, QUININE, CINCHONINE, THE HYDROCYANIC ACID, NARCOTINE, STRYCHNINE, NUX VOMICA, EMETINE, ATROPINE, PICROTOXINE, BRUCINE, LUPULINE, &c. &c.

WITH

AN INTRODUCTION, AND COPIOUS NOTES.

BY THE LATE

CHARLES THOMAS HADEN, Esq.

Translated from the French of the Third Edition of MAGENDIE'S "*Formulaire.*"

WITH AN

APPENDIX

Containing all the Improvements of the FOURTH EDITION, *published in Paris July* 1824.

FOURTH EDITION.

By ROBLEY DUNGLISON, M.D.
F.R.S. NANCY; F.L.S. PARIS.

LONDON:
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☞ *Those passages which are enclosed in crotchets have been added to the present Edition.*

Erratum.

At page 78, Note, for *M. Carzoneri*, read *M. Canzoneri.*

PREFACE

TO THE SECOND EDITION.

Owing to the lamented death of the Author of the First Edition of this little Manual, and the favourable reception which the work has met with from the Profession, the whole of the first impression having been sold off in an unusually short space of time, the present Editor has been requested to prepare a new Edition for the press: he has accordingly endeavoured, by the addition of all the important information which has appeared since the First Edition was sent forth, on the various subjects embraced by the Formulary — as well as of a copious Index, Posological Table, Tables of the proportion of active ingredients contained

in the various compounds, the Latin synonyms, &c. —to render the work more extensively useful, not only to the prescriber, but also to the compounder.

ROBLEY DUNGLISON.

15, *Fenchurch Street*,
April 8th, 1824.

THE

TRANSLATOR'S PREFACE

TO THE FIRST EDITION.

Great credit is due to the French chemists, and especially to MM. Pelletier and Caventou, for having discovered that the active principle of several of our chief remedies resides in peculiar alkalis; and also for isolating these alkalis so that they may be used in practice according to a determinate and intelligent principle. Great praise is also due to M. Magendie for the indefatigable way in which he has investigated the action of these new alkalis on the human body. It cannot therefore be unacceptable to all classes of the Medical Profession, to have laid before them a translation of M. Magendie's little work respecting them. To druggists, and to operative apothecaries, it must be acceptable to have thus collected a full account of the mode of preparing these different alkalis; and it must be acceptable to the practising part of the

Profession, to have thus collected all that is at present known respecting the properties and mode of exhibition of these powerful remedies.

M. Magendie, however, in his preface, avows a principle respecting the similarity of the action of poisons and other new remedies on man and on animals, which, perhaps, ought to be taken with some caution. M. Magendie is probably correct in the main; and we are bound to place much dependence on an assertion made by such a man as he is, when he says that the truth of his opinion has been proved by ten years' experience. If, indeed, we can believe what we read in Withering's Botany, M. Magendie cannot be entirely correct; because we see statements in that work of many plants being poisonous to one animal, and often also to man, whilst they are harmless when eaten by others, even of the higher class of animals. It is very well known, also, that the doses of different medicines vary so largely when given to the different domestic animals, as to afford comparative deductions, which, if we were to apply the information thus gained to the exhibition of the same remedies in man, would often lead us to err greatly, either as to giving the medicine in an under or over dose. It is perfectly well known, too, that there is perhaps none, even of the most virulent vegetable poisons, which does not

afford nourishment to one or more individuals of the lower class of animals.

Nevertheless, as it is rational to believe that M. Magendie's principle is correct, and that the cases mentioned in opposition to it, are only those exceptions which we find appertain to all our general and artificial principles, these cases should only teach us caution in the application of the principle to practice.

There exists, however, an objection to the principle of thus isolating and concentrating the active parts of our remedies. Perhaps every practitioner feels that medicinal substances are more efficacious as they are presented to us combined by the hand of Nature, than when their active part is isolated and recombined by the hand of man. Thus then we are all inclined to give our remedies in substance, as it is called, rather than as prepared in a more convenient form by the chemist or the druggist; and we are only deterred from using these natural preparations by the greater bulk, and other inconvenient properties of them, as compared with our more artificial preparations. Thus, also, we all feel that our artificial mineral waters, however accuratey they may imitate the natural ones, do not produce the same good effect as those natural ones do; and even some of them, for instance the Bath waters, appear

on analysis to be so pure, and free from extraneous ingredients, that we are reduced to the necessity of attributing their often powerful effects to the presence of some evanescent principle, which cannot be detected by chemical analysis.

It is probable, that if these objections were rigorously investigated, it would be found that there is but little truth in them. The superficial grounds on which most men take up their opinions, are very likely to lead to error in cases like this, where so many collateral circumstances are to be taken into the account. Medicines, for instance, in the form of extract, are not usually to be depended on; but that much of this arises from the action of heat on the remedy, and much on other injurious modes of preparation, is proved by the great improvements that have been lately made in the preparation of extracts. And even with regard to the mineral waters, it is a fair question whether the artificial substitutes for them would not be equally efficacious, if taken exactly under the same circumstances, and the takers were made to believe that they were swallowing the natural and not the artificial production?

At all events, if we take these isolated and concentrated remedies as they are, we find that at least many of them are endowed with peculiar and

powerful properties; and as nobody can deny that it is far more convenient to use remedies which are thus small in bulk, we have only to take such remedies as if they were simple remedies, and investigate their properties as we would those of any natural production, and we have no right to find fault.

In this point of view the several advantages pointed out by M. Magendie in using remedies thus concentrated and freed from their nauseous and often jarring principles, stand good in full force; and we often find particular patients, and especially children, so averse to take medicine in the ordinary form, that life is often lost by the delay which is thus produced, or even by the injurious excitation which offering medicine to such persons frequently occasions.

A further objection to the employment of these remedies remains. The expense of preparing them is very great. It is to be hoped, however, that such improvements will in future be made, as will obviate these inconveniences in a great degree.

The Translator, however, cannot refrain from mentioning one species of objection to the adoption of such new forms of remedy, because he considers it to be a superficial one, and an injurious one too; for it is subversive of one of our best means of im-

proving the therapeutical branch of our profession. He is almost angry when he sees the popular authors of the day sneering at the introduction of new remedies, and saying, with what he considers to be an ignorant self-conceit, " Ay, here they come, one after another, vaunted to the skies for properties which sober investigation shews not to belong to them; we shall soon see them laid on the shelf, until they are again held up to the world as prodigies by some future enthusiastic searchers after novelty." How humiliating such remarks are to the person who makes them! for it is easy to prove, that in the great majority of cases, the sneer is applicable, not to the remedy, but to persons who are too ignorant or too indolent to investigate its properties so thoroughly as to use it with success. Men who really think for themselves, and are not content with conclusions unless they are drawn from an accurate and philosophical consideration of *all* the circumstances of each individual case, know full well, that the trials of new remedies which are made by the Profession at large, are so superficial and inconclusive, as to be a disgrace to themselves, and not worthy of the slightest attention when the value of such remedies is under discussion. It should be recollected, that the majority of persons who bring forward a new remedy, have studied the properties

of the remedy more or less accurately—at least enthusiastically; and it is too much to give the direct lie to their assertions. It cannot be doubted that most of them have done with the remedy what they say they have done; and it would be at least cautious, as well as properly humble, if those who come after the first promulgator were to ask themselves, before they condemn the remedy, if they have taken sufficient pains to make themselves as well acquainted with its powers as the promulgator had done.

To shew to what an injurious extent the practice of superficially sneering at new remedies exists, the Translator cannot help recording the observations of one of the chief London medical men respecting the stethoscope. He laughed at it as a piece of quackery. He was asked if he had ever used it, or personally knew any thing about it, or if he had read Laennec's book? He answered, no!

It will be easy to illustrate these apparently severe remarks. Take any of the depreciated remedies, and will it not be seen that many individuals exist in the Profession who have the power of using them with equal, if not greater effect than the original promulgators had done? Digitalis, for instance, is decried by the great majority of practitioners; and yet the Translator knows one practitioner at least who uses it largely, and with the very best effect.

But then he does not order *so* many drops of the tincture to be taken *so* often, and then leave his patient to take his chance; but he increases every dose until he produces the effect which he wishes: besides, he has industry enough to watch the effects which follow each dose; so that he at once acquires a full power over the remedy, and secures his patient from the injurious consequences of an over-dose. If the rest of the Profession acted with the same acuteness and industry, they would probably change their opinions with regard to the powers of digitalis.

The same observations apply to the use of prussic acid, colchicum, and many other remedies, which are now sneered at by ignorant or idle persons.

Indeed, it may be said that they apply almost equally to our most common remedies. Few *study* the powers of any remedy as they ought to do; and hence they use calomel to purge or to salivate — ipecacuanha to produce sickness — and so on, without ever dreaming that all these remedies have much more important powers, if industry were employed in searching for them. Thus many persons use calomel beneficially for several purposes; and one, at least, with whose practice the Translator is acquainted, has taught himself the power of employing ipecacuanha, not only as what may be called

a new and most efficacious remedy in certain extensive classes of disease, namely, those of the mucous membranes, but to use it as a powerful means of subduing general increased action.

Again, if a review be made of the different new remedies which have been lately proposed, will it not be seen that each of them is pretended to have certain peculiar and distinctive properties, which, if they really belong to them, are greatly to be valued when properly applied to the treatment of disease? Digitalis, for instance, seems to exert a direct influence on the action of the heart and arteries. Colchicum appears to do the same thing, with the addition of a purgative quality. Prussic acid seems to have similar powers, with the additional one of appearing to act particularly on the mucous membranes. Strychnine, in like manner, is said to exert a peculiar influence over the nerves which supply muscles with their energy; or perhaps it has the power of increasing the irritability of the muscles themselves. Iodine seems to possess a similar stimulating power, which is particularly expended on that part of the system which is called lymphatic.

It need not be said, that it is very advantageous to possess remedies (if we do possess them) of such useful as well as distinctive powers; and, therefore, it is to be hoped that medical men will cease to

humiliate themselves by superficially sneering at new remedies, until they have qualified themselves to give an opinion, by faithfully and industriously investigating the real properties of these remedies.

Lastly, the fact that some of these remedies produce inordinate effects on particular persons, forms no reason for discarding them from practice; because the same fault appertains even to our most favoured remedies. The Translator has seen the sixth of a grain of tartarized antimony vomit and purge an exceedingly robust farmer, until it brought his life into danger; cases are on record in which persons could not bear even the smell of ipecacuanha; and the Translator has seen four grains of calomel produce a violent and even dangerous salivation. On the contrary, he has used colchicum almost as largely as any man; and yet he can say that it produces those unlooked-for bad consequences quite as seldom as any of the three remedies he has mentioned above*: and he knows that a practitioner,

* The following anecdote is decisive of the safety of using colchicum, and of its utility. A gentleman, whose practice as a general practitioner exceeds £3000 a year, and who uses colchicum (principally the powder) as his general remedy for inflammatory complaints, lately told the Translator that only two persons had died in his practice during the preceding twelve months; one of the two having

who is spoken of in a former page, rarely, if ever, sees inconveniences produced by digitalis in his practice, although he sometimes pushes its use to an extent which would frighten less accomplished practitioners; but then he uses it with a philosophic caution, and a determinate object, which are well worthy of imitation by the Profession at large.

The Translator has added Notes, which comprise a reference, he believes, to almost all the authorities on the subjects treated of. He wishes he could add records of the several remedies having been employed by British practitioners; but with the exception of the prussic acid and iodine, which have been somewhat extensively used, he believes that the other preparations have not been even seen in this country, except as matters of curiosity. It were to be wished that M. Magendie had given the particulars of his experience of their prescription in the human subject. Several French Journals, and especially his own excellent *Journal de Physiologie*, contain an abundance of cases in which the sulphate of quinine has been used with marked benefit in the latter stages of malignant fevers, in all forms of in-

been a phthisical patient, and the other an old lady who had gradually sunk, worn out by an illness of three years' continuance.

termittent fever, and especially in many varieties of neuralgia; but the Translator is ignorant that any published cases exist in which the other alkalis have been employed.

N. B. — In addition to the Notes added by the Translator, it may be remarked, that a good general article on the properties of the new alkalis may be found in the *Edinburgh Medical and Surgical Journal.* It is in Number LXX. for January, 1822.

Sloane Street, May, 1823.

AUTHOR'S PREFACE.

In spite of the opposition of the physicians of the seventeenth century — notwithstanding the celebrated decree of parliament which proscribed emetic tartar — and in spite of the spiritual sarcasms of Guy Patin — the utility of antimonial remedies has been long recognised. For once, at least, prejudice gave way before evidence.

The same thing, I trust, will occur with other new substances which chemistry and physiology hold out to us as valuable remedies; and that the repugnance with which many enlightened practitioners look on them, will soon disappear before the results of an experience which daily shews their advantages.

The impossibility of isolating by chemical ana-

lysis the elements of medicines, has much retarded the progress towards perfection of the materia medica; and even now, when such an analysis can be made, the belief that existed, and which still exists in some degree, that medicines act altogether differently on man to what they do on animals, has prevented the ultimate principles of remedies from being investigated. Still nothing is more unfounded than this belief. A varied experience of more than ten years, both in the laboratory and at the bedside, induces me to affirm, that medicines and poisons act in the same manner on man as on animals*. I am so sure of this, that I would willingly try on myself substances which have been proved to be innocent when given to animals; but I would not recommend any one to make the experiment inversely.

The physiological properties and medical virtues of most of the substances described in this Formulary, have been determined by a reference to the above principle.

* See remarks on this important observation in the Translator's Preface, p. x. — Tr.

These substances, which are already sufficiently numerous, act when given in small doses; every principle which might mask or hinder their action has been separated from them; their effects bear a decisive character, which cannot be misunderstood, for they have been studied with care both on animals and on man when in health and when in disease; a perfect knowledge of their chemical properties, and great accuracy in their mode of preparation, are sufficient to secure uniformity with regard to their strength and manner of action; and, lastly, each of them forms a medicine in its most simple and energetic state.

Time alone can pronounce definitively on the advantages and inconveniences of these new remedies; but whichever way it may be, the following pages may be useful, by teaching the mode of preparing them, without making it necessary to consult general treatises on chemistry or pharmacy; and by giving medical men every facility in submitting them to personal experience, which is frequently, after all, the only truly profitable course.

I shall feel extremely grateful for any critical or other remarks appertaining to the substances treated

of in this work. To those of my medical brethren who may be kind enough to address them to me, I return my thanks beforehand; and I shall hasten to turn them to the improvement of science, by inserting them in the next edition.

FORMULARY, &c.

MORPHINA[a]. MORPHIUM, MORPHIA.

Morphine.

NOTHING better shews the imperfection of the science of medicines, so singularly denominated *Materia Medica*, than the history of opium; alternately it has been proscribed as eminently hurtful, or vaunted as a panacea. By some it has been supposed to calm, and procure sleep;

[a] [The ending in *ina* has been preferred, inasmuch as errors will be less likely to arise, from the greater dissimilarity between the terminations of the names of the plant and its base, than when any other of the terms which have been proposed are employed: as regards *strychnia* no inaccuracy need have been apprehended; but the terms *cinchonia*, *veratria*, *solania*, *atropia*, are so similar to those of the plants of which they are the bases, that, especially if the words were abridged, the occurrence of many mistakes might be apprehended. Added to which, those bases, as *morphina* and *emetina*, which have been admitted into the Parisian Pharmacopœia, have been latinized according to the plan here adopted.]

others, on the contrary, have averred that it is always a stimulant: whilst others, less exclusive, have described it to have stupifying, soporific, narcotic, acrid, calming, and other properties. Led by this latter *dictum*, the chemists of the last age endeavoured to find the divers properties of opium in different principles. On the other hand, the most celebrated physicians have not scrupled to put their names to certain preparations of opium which they thought preferable to any other. What effects are there, however, to authorize the celebrity of the laudanum of Sydenham — Rousseau's drops — the tinctures of opium — the syrups of diacodium — the resinous and aqueous extracts, &c.? And what reason is there why a practitioner should employ any of these preparations to the exclusion of the others?

The sciences mutually depend upon, and assist, each other; and it would have been impossible to remedy this uncertainty without the recent perfection in our chemical modes of analyzing vegetables, and without the successful application which has been made of them in analyzing opium.

The result of this chemical analysis, and especially of the researches of MM. Derosnes[b],

[b] In 1803. See *Annales de Chimie*, vol. xlv. — Tr.

Sertuerner[c], and Robiquet[d], is, that opium is composed, 1st, of a fixed oil; 2dly, of matter analogous to caoutchouc; 3dly, of a vegeto animal substance, which has not yet been sufficiently investigated; 4thly, of mucilage; 5thly, of feculent matter; 6thly, of resin; 7thly, of the remains of vegetable fibre; 8thly, of narcotine; 9thly, of meconic acid; 10thly, of the acid discovered by M. Robiquet; and, 11thly, of morphine. This last principle will alone occupy us on the present occasion.

PREPARATION OF MORPHINE.

M. Robiquet's method is as follows[e]: — He boils, for a quarter of an hour, a very concen-

[c] *Ibid.* vol. v. His principal paper was published in 1817. — Tr.

[d] *Ibid.* vol. v. p. 276. — In addition to these gentlemen, M. Seguin, in 1804, discovered a crystalline body in opium, and described most of its properties; but he seems to have been perfectly unaware of its alkaline qualities. *Ibid.* vol. xcii. — Tr.

[e] *Annales de Chimie et Phys.* vol. v. p. 276.—Dr. Paris (*Pharm.* vol. ii. p. 313) gives the following as M. Robiquet's process, as contained in the *Codex Medicamentarius* of Paris, of 1818: — " Three hundred parts of pure opium are to be macerated, during five days, in one thousand parts of common water. To the filtered solution fifteen parts of perfectly pure magnesia (carefully avoiding the carbonate) are to be added. Boil this mixture for ten minutes, and separate the sediment by

trated solution of opium with a small quantity of magnesia, (10 grains [gr. 8.2 troy] to the pound of opium, [15 oz. 6 dr. 1 gr. troy[f].]) He collects the greyish and somewhat abundant deposit on the filter, and washes it with cold water. When this precipitate is well dried, he treats it by weak alcohol for some time, at a temperature less than that of ebullition. By this means he separates very little morphine and much colouring matter. He filtrates and washes the precipitate by means of a little cold alcohol: then strongly boils it in a large quantity of rectified alcohol; filtrates again whilst the liquor still boils, and he finds that the morphine separates as the liquor cools. The colouring matter is got rid of by repeated crystallization.[g]

a filter, washing it with cold water until the water passes off clear. After which, treat it alternately with hot and cold alcohol 12-22° Beaumé, (or s. g. 923), as long as the menstruum takes up any colouring matter. The residue is then to be treated with boiling alcohol of 22-32° Beaumé, (or s. g. .868), for a few minutes. The solution, on cooling, will deposit crystals of morphia."—Tr.

[f] Mr. Thomson says 184 grains to the lb. of opium, which is probably a mistake; because, although he quotes from M. Robiquet's paper in the *Annales de Chimie*, his words are, "boil, &c., *with a small quantity* (184 grains to lib. 1. of opium) of magnesia." 184 grains is not a small quantity.—Tr.

[g] Mr. Thomson obtained "from good *Turkey* opium

[M. Choulant recommends a dilute aqueous infusion of opium to be concentrated and left at rest, until it spontaneously lets fall its sulphate of lime in minute crystals; the liquor is then evaporated to dryness, the residuum dissolved in a little water, and any remaining lime and sulphuric acid thrown down by the cautious addition, first, of oxalate of ammonia, and then of muriate of barytes. The liquid is next diluted with a large body of water, and caustic ammonia added so long as any precipitate subsides. This is dissolved in vinegar, and thrown down again with ammonia. The precipitate is digested with about twice its weight of sulphuric ether, and the whole thrown upon a filter. The dry powder is to be digested three times in caustic ammonia, and as often in cold alcohol. The remaining powder being dissolved in twelve ounces of boiling alcohol, and the filtered hot solution being set aside for eighteen hours, it deposits colourless transparent crystals, consisting of double pyramids. By concentrating

nearly three times the quantity of morphine yielded by the same weight of *East Indian* opium. That from the latter was also more coloured and in smaller crystals." This fact sufficiently accounts for the superiority of the opium from Turkey.—Tr.

the supernatant alcoholic solution, more crystals may be obtained[h].]

Dr. Thomson has given the elementary composition of morphine in the Annals of Philosophy for June, 1820[i]. He also there describes what he considers to be an easy method for procuring this base in a state of purity. He precipitates a strong infusion of opium by caustic ammonia, separates the brownish-white precipitate by means of the filter, evaporates the infusion to a sixth of its volume; and on mixing it with a fresh quantity of ammonia, he obtains a new precipitate of pure morphine. He gives time for the deposit to form; then separates it, by means of the filter, and washes it with cold water. After it is sufficiently drained, he sprinkles it with a little alcohol, which he permits to pass through the filter; this fluid dissolves a large portion of the colouring matter, and also a little of the morphine. He then entirely dissolves the morphine in acetic acid, and takes away the colouring matter which remains, by treating the solution with a little ivory-black, shakes

[h] [Ure's *Dictionary of Chemistry*, 2d edition, 1823.]

[i] It is useless to give this account, because Dr. T. himself shews that it must be inaccurate. — Tr.

this mixture often during twenty-four hours, and then throws it on the filter. The liquid passes through entirely colourless; and on treating it again with ammonia, the morphine is precipitated in the form of a white powder. If this base be then dissolved in alcohol, and the solution permitted to evaporate spontaneously, the morphine crystallizes in the form of beautiful regular crystals. These crystals are perfectly white, have a slight opaline transparency, are entirely devoid of odour, and have an extremely bitter taste. They appear in the form of rectangular four-sided prisms.

Sertuerner also uses ammonia, instead of magnesia, to decompose the natural meconate. He then forms a sulphate of morphine by adding sulphuric acid, which he again decomposes by means of ammonia; and after dissolving the free morphine in boiling alcohol, he obtains it in crystals, as the liquor cools. This latter method is said, however, to form an impure coloured salt, and also not to yield as much morphine as those described above.

[Mr. Brande has lately given the following estimate of the relative proportions of the ultimate elements of morphine:

Carbon	72.00
Nitrogen	5.50
Hydrogen	5.50
Oxygen	17.
	100 [k]

ACTION OF MORPHINE ON MAN AND ON ANIMALS.

Pure morphine being but little soluble, would scarcely seem to form the narcotic part of opium[l]. Nevertheless, direct experiment has abundantly proved that such is the fact. For example, even the weak dose of a quarter of a grain, or half a grain (gr. .205, or 0.41 troy,) of morphine, dissolved in oil, produces effects very markedly narcotic; but this narcotic power becomes very manifest when the morphine is combined with acids; because the salts of morphine are more soluble than the morphine itself[m].

[k] [*Journal of Science*, &c. No. 32.]

[l] It must be recollected that morphine does not exist free in opium. It is united to the meconic acid, and is thus in the state of a salt of morphine. Should not the meconate be made and tried, it being the natural preparation? Tr.

[m] See MM. Orfila and Magendie's experiments on this subject in the *Nouveau Journal de Médecine*, tom. i. p. 123. Tr.

I employed the acetate, the sulphate, and the hydrochlorate, of morphine, as remedies, nearly three years ago; and found that these salts afford all the advantages which we can expect to meet with in opium, without having any of its inconveniences [n]. As my first trials shewed that the hydrochlorate was less useful than the acetate and sulphate, I soon discontinued my researches on that salt. Perhaps it would be well were they resumed.

MORPHINÆ ACETAS.

Acetate of Morphine.

This salt is formed by combining directly, in an evaporating dish, acetic acid and morphine, and letting the mixture slowly evaporate to dryness. The difficulty of obtaining it crystallized, on account of its extreme deliquescence, renders it necessary to adopt this mode of preparation [o].

[The acetate of morphine has obtained a

[n] *Nouveau Journal de Médecine*, Paris, 1818.

[o] The *acetate* of *morphine* crystallizes in soft silky prisms, which are very soluble; the *sulphate*, in arborescent or branching crystals, soluble in two parts of water at 60°; the *carbonate*, in short prismatic crystals, soluble in four parts of water at 60°. (Thomson's *Dispensatory*, p. 419.) — Tr.

place in the Paris Pharmacopœia, and the following directions are laid down for its preparation: "Take of morphine 4 parts; distilled water 8 parts; dilute the morphine in a porcelain vessel, afterwards add acetic acid s. g. 1.075, until turnsol paper becomes scarcely converted red: evaporate the solution to the consistence of syrup. Continue the evaporation slowly, either in the sun or in a stove; collect the salt, and reduce it to powder[p].]

MORPHINÆ SULPHAS.

Sulphate of Morphine.

Dissolve the morphine in sulphuric acid previously diluted with water. The solution, made hot and evaporated to a certain point, crystallizes, on cooling, in silky tufts. This salt very much resembles the sulphate of quinine, with which it may be confounded; but it becomes red when treated with concentrated nitric acid, which is not the case with the sulphate of quinine.

[The Paris Pharmacopœia directs 6 parts of morphine to 12 of distilled water to be used,

[p] [*Codex Medicamentarius*, sive *Pharmacopœia Gallica*, 1818. P. 387.]

and that the sulphuric acid should be diluted with twice its bulk of water, and added to the morphine, until turnsol paper is no longer converted red.]

MODE OF PRESCRIBING THE SALTS OF MORPHINE.

As it was my desire to form officinal preparations of the salts of morphine, which should resemble as closely as possible the most common preparations of opium, I first made a syrup of morphine according to the following formula :—

SYRUPUS MORPHINÆ ACETATIS.

Syrup of Acetate of Morphine.

Take of

Perfectly clarified syrup · · 1 pound, (15 oz. 6 dr. 1 gr. troy.)
Acetate of morphine · · · · 4 grains, (gr. 3.281 troy.)

Form a syrup which will supply the place of the syrup of diacodium; and the more advantageously, as the latter preparation is, as it were, arbitrary, and therefore not uniform.

The syrup of morphine is at present generally used in Paris. The dose is two tea-

spoonfuls (*cuillerée à café*)[q] every three hours. Sleep, however, is often produced by a much smaller quantity—by two tea-spoonfuls, for example, given at bed-time in a little water.

SYRUPUS MORPHINÆ SULPHATIS.

Syrup of Sulphate of Morphine.

Take of

Perfectly clarified syrup • 1 pound, (15 oz. 6 dr. 1 gr. troy.)
Sulphate of morphine •• 4 grains, (gr. 3.28 troy.)
Form a syrup.

The dose is the same as that of the syrup of acetate of morphine.

I employ this syrup when patients have become accustomed to the action of the syrup of the acetate: for, generally speaking, by varying the salts of alkaline medicines, their action on the animal economy may be kept up for a very long time, and without increasing the dose too considerably[r].

[q] [In the first edition the *cuillerée à café* was incorrectly rendered, Anglicè, "a *tea-spoonful;*" whereas its capacity is two drams, French; or, at least, two tea-spoonsful, English.]

[r] Some English writers have denied the truth of this observation; but they have not given any reason for their scepticism. Why should it not be true?—M.

GUTTÆ ANODYNÆ.

Anodyne Drops.

Take of

Acetate of morphine	16 grains, (gr. 13.12 troy.)
Distilled water	1 ounce, (7 dr. 52.5 gr. troy.)
Acetic acid	3 or 4 drops.
Alcohol	1 gros, (gr. 59 troy.)

To keep the salt in solution.

These drops are a good substitute for liquid laudanum, Rousseau's drops[s], tincture of opium, &c.

[s] Rousseau's drops resemble the black drop. The mode of forming them is as follows: — " Take of white honey ℥xij (11 oz. 6 dr. 30.72 gr. troy); warm water ℔iij. (oz. 47.203 troy); dissolve the honey in the water; pour the mixture into a matrass, and place it in a very warm situation: when the fermentation commences, add 4 ounces (3 oz. 7 dr. 30.2 gr. troy) of opium, previously dissolved in ℥xij. (11 oz. 6 dr. 30.7 gr. troy) of water; suffer the fermentation to continue for a month, in a situation the temperature of which is 30° (86° Fah.); then strain, filter the liquor, and evaporate it until only 10 ounces (9 oz. 6 dr. 45.6 gr. troy) remain; strain again, and add of alcohol ℥ivss. (4 oz. 3 dr. 26 gr. troy.) Seven drops of this liquid contain about one grain of opium. — *Conspectus des Pharmacopées de Dublin, d'Edimbourg, de Londres, et de Paris, &c.* Paris, 1820. — Tr.

The dose is from 6 to 24 drops. The sulphate of morphine may be used instead of the acetate, if it be thought proper.

[As, however, the above drops are apt to allow of the morphine being deposited when kept for a short time, the present formula had better be substituted: —

LIQUOR MORPHINÆ ACETATIS.

Solution of Acetate of Morphine.

Take of

Acetate of morphine	gr. 16
Distilled water	ʒvj.
Dilute acetic acid (P. L.)	ʒij.]

Besides these forms of prescription, the acetate and sulphate of morphine may be given in pills, in electuary, in draughts, or in mixtures; the dose being from a quarter of a grain to a grain (from gr. 0.205 to 0.82 troy,) in the twenty-four hours.

NARCOTINA.

Narcotine — Opiane — Matter, or Salt of Derosnes.

My researches have not led me to consider this matter as a medicine; I shall, however, give its history here, because it is one of the immediate principles of opium, and has thrown, and still continues to throw, much uncertainty over the subject.

[PREPARATION OF NARCOTINE.

In order to obtain Narcotine, according to the process of Sertuerner, opium must be exhausted by two parts of boiling ether; and this operation be repeated five successive times. The solution thus obtained must be mixed and filtered, and the ether volatilized, until the whole is reduced to three-fourths. A product is then obtained, formed of two distinct parts, viz. of a saline crust, which consists of narcotine united with an acid, and of a brown, bitter, and acid liquor, containing

resin, narcotine, and an acid,—probably the acetic. In order to obtain the narcotine from this liquor, it must be subjected to evaporation; the residuum treated with boiling water, which does not dissolve the resin, and the narcotine be precipitated from the filtered liquor by ammonia. The narcotine is afterwards obtained from the saline crust, by depriving it first of the resin and caoutchouc, by means of rectified oil of turpentine, washing the residuum with cold alcohol, dissolving it afterwards in hot, and precipitating the narcotine by ammonia. This precipitate, as well as the former, is then dissolved in the least quantity possible of hydrochloric acid, and again precipitated by ammonia.

CHEMICAL PROPERTIES OF NARCOTINE.

Narcotine crystallizes from its alcoholic or ethereal solution, in fine needles or in rhomboidal prisms. It has no action on vegetable colours. It is without smell and taste. Cold alcohol dissolves $\frac{1}{100}$th part, and boiling $\frac{1}{24}$th, of its weight. Hot ether dissolves it in considerable quantity, and suffers it to be deposited in a crystalline form on cooling[a].]

[a] [*Chimie Organique de Gmelin*—Edition de Virey. p. 392.]

PHYSIOLOGICAL PROPERTIES OF NARCOTINE.

If a grain (gr. 0.82 troy) of narcotine, dissolved in oil, be given to a dog, it produces a state of stupor, which superficial observers might readily confound with sleep; it differs, however, evidently from sleep: the animal's eyes are open, but the respiration is not deep, as in sleep, and it is impossible to rouse it from its sullen and motionless state. Death generally takes place in twenty-four hours.

Narcotine, combined with acetic acid, produces entirely different effects. Animals can support a dose of even 24 grains (gr. 19.68 troy,) without perishing; and whilst under its influence, they are agitated by convulsions like those which camphor produces. They exhibit the same signs of fright, the same motions backwards, the incapability of going forwards; and, lastly, the foaming at the mouth, the convulsions of the jaws, &c.

When I have given morphine and narcotine together, the different effects of each have been produced at the same time.

A grain (gr. 0.82 troy) of morphine, for instance, and a grain of narcotine, each dissolved in acetic acid, were placed in the pleura of a dog. The animal soon became

drowsy, and even fell asleep under the influence of the morphine; but a very singular and remarkable struggle appeared, at the same time, to go on for an hour and a half between the stimulating effects of the narcotine and the anodyne effects of the morphine. At last, however, the animal slept soundly; it being probably then under the sole influence of the morphine. May it not be inferred from this experiment, which I have often repeated in various ways, and with analogous results, that the variable effects of opium are to be attributed to its containing these two opposite principles?

This opinion derives support from the fact, that persons who take morphine do not experience the exciting property, which they can readily distinguish in the aqueous extracts of the shops, in which the narcotine and morphine are contained together [b].

[b] M. Magendie's conjecture is probably true; and, as is said in the Translator's Preface, it forms one of the most valuable properties of the isolated morphine, that the stimulating and constipating effects of opium are thus avoided. Mr. Battley ought to publish the formula for his *liquor opii sedativus*. It is beneath him, as an old practising member of the profession, and *really useful* chemist, or rather druggist, to practise such a paltry concealment; but the Translator knows, by personal experience, that the liquor opii sedativus is devoid of exciting,

EXTRACTUM OPII NARCOTINÂ PRIVATUM.

Extract of Opium deprived of Narcotine.

My experiments on the matter of Derosnes having shewn that it is hurtful when not united to an acid, and very exciting when so united[c],

and almost of constipating, properties — his pulse has repeatedly fallen several beats within a minute after taking 12 or 15 drops.

It seems that Dr. Porter, of Bristol, recommends a *liquor morphii citratus*, which he makes as follows: — Beat four ounces of the best crude opium in a mortar with ℥ij. of crystallized citric acid; mix well with a pint of boiling water; filtrate after twenty-four hours' maceration. Dr. Paris speaks well of this preparation, and probably with justice.

The Translator, who has, unfortunately, taken more than he likes of Mr. Battley's preparation, once, from necessity, made a substitute, by macerating the dregs remaining after making tincture of opium in a solution of tartaric acid. The preparation formed a tolerably deep tincture, and 40 drops acted, he thinks, in all respects, like 20 of the liquor opii sedativus. It neither stimulated nor produced costiveness. — Tr.

[c] This latter fact has been recently disputed by M. Orfila. I am ignorant what has prevented him from arriving at a similar result to myself; but I vouch for the exactness of the fact which I have advanced, and am ready to prove it to M. Orfila whenever he wishes.—M.

M. Robiquet attempted to prepare an extract of opium which should be entirely devoid of this substance.

He macerates coarsely divided opium in cold water, filtrates and evaporates to the consistence of a thick syrup, digests in rectified ether, and, after frequent shakings, decants the ethereal tincture, and separates the ether by distillation. He repeats this operation so long as crystals of narcotine appear as the residue of the distillation. When the ether produces no further effect, he evaporates the solution of opium to a pilular consistence: and thus obtains an extract which is entirely devoid of narcotine[d].

[d] Mr. Thomson, in a note to the account of the extractum opii, in his *Dispensatory*, says,

"This extract, however, contains some of Derosnes' salt also, or narcotine, as it has been lately termed; and this is supposed to produce the excitement, which even the aqueous extract occasions previous to its sedative effect. M. Robiquet (*Jour. de Pharmacie*, May, 1821,) proposes to free it of this principle by agitating the extract as soon as it acquires the consistence of syrup with ether, and repeating this agitation with fresh portions of ether as long as the extract on distillation deposits any crystals of narcotine. The extract, thus prepared, contains only morphia, gum, and extractive," p. 769.

It may be added, that the freedom from narcotine which characterizes the extractum opii (which is aqueous)

I have tried the extract thus prepared on animals. Its action appears to be decidedly narcotic and entirely like that of morphine; only weaker.

I have also employed it in practice with advantage, especially on a young Greek physician of the greatest promise, who had not been able to bear well the common aqueous extract of the shops.

This new preparation of opium, therefore, seems to deserve the attention of physicians.

EXTRACTUM OPII MORPHINÂ PRIVATUM.

Extract of Opium deprived of Morphine.

The process described under the article MORPHINE does not entirely deprive the opium of this alkali. The residuum always contains a certain quantity. M. Robiquet having communicated to me this fact, I was desirous of seeing whether some further preparation could not be obtained from a matter considered to be useless, and abandoned as such by the apothecaries.

I remarked that this residuum still exerted a certain narcotic property on animals and

ought to recommend it to medical men as preferable to the tincture of opium, which contains narcotine in abundance on account of its being a spirituous solution.—Tr.

on man: a less marked one, it is true, than that of the common aqueous extracts, but sufficiently strong to make it perhaps useful in practice.

This extract may be given by grains; four grains are not apparently equivalent to a grain of the ordinary aqueous extract, or to a quarter of a grain of morphine.

Extract of opium deprived of morphine ought to be kept by all apothecaries who prepare their morphine.

IODINA.

Iodine.

Iodine is a simple body, discovered, in 1813, by M. Courtois, in the mother waters of soda, as it is obtained from sea-weed. [a] The name of iodine is derived from the Greek word ἰωδὴς, on account of the blue colour of its vapour.

[a] [Iodine has been obtained from a great variety of sea-plants, as the Fucus *saccharinus, digitatus, serratus, vesiculosus, siliquosus, filum, nodosus, palmatus, digitatus, rubens, cartilagineus, membranaceus,* and *filamentosus;* Ulva *pavonia, umbilicalis,* and *linza,* &c. It has also been procured from sponge by Dr. Fyfe and M. Straub of Hofwyl; M. Fodèré, however, has strong doubts whether this substance really exist in sponge; and he informs us that M. Hecht, a pharmacien at Strasburg, has not in any case been able to detect it by means of starch, which is the best test for it: it is difficult to account for the results of M. Hecht's experiments, as the ashes of sponge do incontestably turn slightly blue on the addition of starch: from the small quantity, however, of iodine comprised in it, it is very improbable that the medicinal efficacy of burnt sponge can be wholly dependent on the iodine which it contains.]

Iodine is solid at the ordinary temperature, in the form of small greyish crystals, which have but a feeble tenacity, and the aspect of plumbago. It fuses at 170° c. (338° Fah.) and volatilizes at 175° c. (347° Fah.) forming a very beautiful violet-coloured vapour. This vapour, when enclosed in a receiver, re-condenses into crystalline scales.

Iodine is soluble in ether and in spirit of wine; the former taking up more or less according to its degree of rectification. At 35° (.842) and a temperature of 15° c. (59° Fah.) it dissolves nearly $\frac{1}{5}$th of its weight. At 40° (.817) of concentration, and at the same temperature (104° Fah.) it dissolves $\frac{1}{6}$th. Water only dissolves $\frac{1}{7000}$th of its weight.

Iodine enjoys the property of forming an acid with hydrogen, and another with oxygen.

Iodine cannot be combined with oxygen in the gaseous form: it unites, however, with it when the gas is in a nascent state, and forms iodic acid.

Iodine has much affinity for hydrogen, and takes it from a great number of bodies. It absorbs it in a gaseous state when the temperature is elevated; and forms with this gas the hydriodic acid, which is composed exclusively of iodine and hydrogen. This acid presents itself under the form of a colourless gas, which has a very strong taste, a very penetrating

odour, powerfully reddens the tincture of turnsol, and extinguishes burning bodies.

This gas is very rapidly absorbed by water, and is very largely dissolved in it. It gives out also white fumes in the air by uniting with the aqueous vapour contained in the atmosphere.

Hydriodic acid is obtained by pouring water on an ioduret of phosphorus, made of eight parts of iodine and one of phosphorus, and distilling the liquor. The first part which rises is scarcely any thing but water; the last, on the contrary, when collected separately, is very concentrated, and throws up thick fumes into the air.

Hydriodic acid can be united to a great number of bases, and forms neutral salts with some of them, of which the hydriodate of potash has hitherto been the most commonly employed in medicine. The hydriodate of soda has sometimes also been exhibited, and apparently with similar success.

PREPARATION OF IODINE.

It has been stated that iodine is extracted from the mother waters formed in the preparation of soda from sea-weeds, where it exists in the form of hydriodate of potash.

These waters are obtained by burning the different fuci which grow on the sea-shores of Normandy, lixiviating the ashes and concentrating the liquor.

To obtain the iodine, pour an excess of concentrated sulphuric acid on these waters, and boil the liquor by degrees in a glass retort to which a receiver is attached. The sulphuric acid seizes on the base of the hydriodate, and on the hydrogen of the hydriodic acid. Hence result sulphate of potash, water, sulphureous acid, and iodine; which latter passes into the receiver along with a little acid in the form of a violet vapour, and is there condensed. To purify it, it must be washed, mixed with water which contains a little potash, and redissolved.

[Dr. Ure recommends the following formula to be adopted: Take eight fluid ounces of the brown liquid which drains from the salt which the soapmakers who employ kelp, boil up and evaporate to dryness; heat it to 230° Fah. and add one fluid ounce of sulphuric acid, diluted with its own bulk of water. When the mixture cools, separate the crystals of the salts, which will form in it, by filtration through a woollen cloth, and add to the fluid poured into a matrass, 830 grains of black oxide of manganese in powder. A glass globe is then

to be inverted over the mouth of the matrass, and the heat of a charcoal chaffer being applied, iodine will sublime in great abundance. It must be washed out of the globe with alcohol, then drained and dried on plates of glass, and purified by a second sublimation from dry quicklime.]

POTASSÆ ET SODÆ HYDRIODATES.

The Hydriodates of Potash and Soda.

If a solution of soda or of potash be poured on iodine in its metallic state, an iodate and a hydriodate are formed, which may be separated by means of alcohol, which only dissolves the latter of these salts. The hydriodate may then be obtained by evaporation. The hydriodates of soda and of potash may also be obtained, like other neutral salts, by directly combining the acid with the oxide.

The hydriodates of soda and of potash are deliquescent salts, and therefore very soluble in water. Their solutions are still capable of dissolving iodine: thus forming an ioduretted hydriodate.

ACTION OF IODINE ON MAN AND ON ANIMALS.

M. Gay-Lussac, soon after the publication

of his excellent work on iodine, sent a certain quantity to me, that I might study its effects on animals. In my first experiments I introduced as much as a gros (gr. 59.07 troy,) of tincture of iodine into the veins, without any apparent effect.

Dogs, made to swallow it, vomited; but no other effect followed.

Finding that this new substance was innocuous, I myself swallowed a spoonful of the tincture, without further effect than a disagreeable taste, which went away by degrees after continuing several hours.

I lately also saw a child of four years old who had swallowed, by mistake, a tea-spoonful of the tincture of iodine, prepared by M. Pelletier. The child's lips and tongue were coloured yellow, but no bad consequences resulted [b].

[b] The Translator, who has used iodine freely and successfully in several cases of disease, finds that the above observations scarcely tally with his experience. The tincture frequently stimulates the arterial system so much, that it is necessary to discontinue its use. In one scrofulous case, a girl, six years of age, although she immediately began to recover when she first took the tincture of iodine, and has continued to improve under its use more rapidly than during any former plan of treatment, she is still unable to take the remedy for more than three or four days in succession, in consequence of her skin becoming hot, and a disposition to delirium on

[Dr. Gairdner, however, in a recent *ex professo* work on iodine[c], the first monograph of the kind which has appeared in England, has given a lamentable picture of the effects of that substance when injudiciously exhibited: the symptoms usually produced, in addition to those above described, are said to be, peculiar, great, and persevering anxiety and depression of spirits, which are very different from hypochondriasis, inasmuch as they dwell principally on the present, and have no reference to the future; the emaciation and cholera produced by it, are also described as frequently extending to a dangerous and even fatal result. When the patient is under the full constitutional influence of iodine, Dr. Gairdner has found a degree of tremor to come on, which he considers as a good guage of the extent of nervous excitement which has taken place, and is seldom or never absent when that excitement has proceeded to any considerable degree; this nervous excitement simulates chorea, and occasionally endures for a con-

waking from sleep invariably coming on. However, if M. Magendie's observations be taken literally, they lead to an inference, that the tincture of iodine is an inert substance, unworthy of notice as a remedy.—Tr.

[c] [*Essay on the Effects of Iodine*, &c. By W. Gairdner, M. D. Underwoods, 1824.]

siderable length of time. In the cholera induced by iodine, Dr. Gairdner has found sedatives, such as opium, hyoscyamus, &c., more beneficial than any other class of medicines; purgatives are said invariably to do harm. It is somewhat curious that Decarro, Coindet, Erlinger, Formey, Hufeland, and others, have employed this remedy in a variety of cases, but have never witnessed its deleterious properties: or, at all events, have never described them.]

CASES IN WHICH THE PREPARATIONS OF IODINE MAY BE EMPLOYED.

M. Coindet, a physician of Geneva, first used iodine in medicine. He employed it in the treatment of goître with very marked effects. These trials were repeated by several physicians, both in France and Switzerland; and their observations would seem to prove that we now possess, in iodine, an efficacious remedy for the removal of a disease which has been hitherto cured with difficulty.

Although success may be especially expected to follow the use of iodine when the goître is recent, and has occurred in individuals who have not yet arrived at maturity, the remedy has,

nevertheless, been known to dissipate old, hard, and voluminous goitres: but, as the treatment in these cases is necessarily more protracted, it is found that the long-continued use of iodine injures the stomach. To avoid this inconvenience, iodine has also been applied outwardly by means of friction.

Iodine has been employed in the treatment of scrofula with an equal appearance of success. This point, however, is not so well ascertained as in the case of goître; because much fewer observations have yet been made on the subject.

[In a *Mémoire* read by M. Zinck to the *Société Cantonnale* of Lausanne, two cases of white-swelling are related, which were cured by the administration of iodine. The following history of the same kind has also been communicated to Dr. Gairdner, in a letter from Professor Maunoir of Geneva:—"On the 18th of March, 1821, I was consulted respecting a boy, eight years of age, who had laboured for nearly a year under a white-swelling of the right knee; for which blisters, leeches, discutient applications, internal remedies, &c., had been unsuccessfully employed. There was a considerable augmentation in the size of the knee, which augmentation the attendant physician considered to be seated in the bones rather than in the soft parts; and at the same time the size

of the leg was considerably diminished. The child was unable to execute the least movement without pain, even with crutches; and the leg was permanently bent upon the thigh. I treated the case, in the first instance, by correspondence, without seeing him; frictions were directed to be made with the ointment of iodine, of the size of a hazel nut, night and morning. He also took the tincture of iodine, in the dose of $\frac{1}{12}$th of a grain of the iodine at the most. His stomach was not at all affected by it, and eight months afterwards the father could not resist the pleasure of sending him to Geneva for my inspection; when I found him able to walk and run with facility, the right knee being the same size as the left, and equally serviceable."]

M. Coindet recommends iodine as a powerful emmenagogue; but this latter assertion has not been hitherto confirmed by the obvations of any other physician, and consequently requires to be proved by other facts.

[M. Gimele has also employed iodine in chronic leucorrhœa; but his observations have not been confirmed by any subsequent practitioner[d].]

At the present day (November, 1822,) the

[d] [*Revue Médicale*, t. vii. p. 249.]

Genevese and Swiss physicians are much less enthusiastic with regard to the advantages which they at first imagined to have accrued from the preparations of iodine; they now say that serious accidents have followed their employment, such as chronic inflammation of the stomach, and considerable emaciation of the whole body, particularly of the mammæ. I have never witnessed similar accidents, unless the doses have been carried very high; but this is no reason why we should not be very circumspect in the employment of these new preparations.

[Dr. Coster of Paris, who had an opportunity of witnessing the practice of Dr. Coindet of Geneva, and who asserts that he has frequently used this medicine with the greatest advantage, has lately published a *Mémoire*, in which he ascribes to iodine a more generally efficacious action than, it is to be feared, it is entitled to; this is the more to be regretted, as these overcharged encomiums frequently occasion considerable disappointment, and cause many medicines to be neglected which were deserving of a better fate. According to that gentleman, iodine is useful, 1st, For the resolution of tumours of the thyroid gland, when they are not of a scirrhous, cartilaginous, or bony nature, or when the tumour does not contain calcareous concretions.

2dly; For the restoration of suppressed catamenia, when such suppression occasions any other sanguineous evacuation, or when any irritation, situated in another viscus, causes a flow of blood thither, and turns it from its natural course.

3dly; To determine towards the uterus, the plethora necessary for the establishment of menstruation in young females, where that natural evacuation has not occurred.

4thly; To destroy any disposition to scrophulous phthisis.

5thly; To remove glandular congestions, and indurations of a scrophulous or chronically syphilitic character.

6thly; For the cure of scrophulous ophthalmia, when in a chronic state.

7thly; To hasten the cicatrization of venereal ulcers[e].]

[e] [*Archives Générales de Médecine*, Juillet, 1823.]

Mode of prescribing Iodine.

TINCTURA IODINÆ.

Tincture of Iodine.

Take of

Alcohol at 35° (.842) .... 1 ounce (7 dr. 52.5 gr. troy.)
Iodine ..... 48 grains (gr. 39.36 troy.)

This tincture ought not to be prepared long beforehand, as it soon deposits crystals of iodine. It is to be feared also that the iodine may take up a portion of the hydrogen of the alcohol, and be thus converted into ioduretted hydriodic acid.

The tincture of iodine has been employed with great success in the treatment of bronchocele. It has also been used in scrofula, but not so frequently as the two following preparations.

The tincture of iodine may be given to adults in the dose of 10 drops, three times a-day, in a little sugared water. The dose may be progressively increased to 20 drops three times a-day: — 20 drops contain about a grain of iodine[f].

[f] Besides using the tincture of iodine successfully in a few cases of scrofula, the Translator once saw it signally beneficial in a case, probably of pulmonary tubercles,

[Four cases of bronchocele have been lately published by Mr. Rickwood, which were cured, or relieved, by the tincture of iodine, administered as above recommended; he also states, that he has at present three additional cases under treatment, all of which

in which he prescribed it, according to the suggestion of Dr. Baron in his last work on Tubercles. A thin youth passed the winter and early part of the spring of 1823 in suffering from an almost unremitted succession of attacks of pulmonary excitement. His pulse rose during these exacerbations, his skin became hot, cough came on, and frequently the attack did not terminate without the expectoration of purulent matter, and the occurrence of hectic fever and of night sweats; generally, however, these exacerbations were speedily and perfectly dissipated by the moderate use of colchicum, so that the pulse fell to 72 beats in the minute, and all the other symptoms subsided. Still, early in May, the patient was thin, pale, and in other respects having the appearance of a person labouring under incipient phthisis. Under these circumstances he took ten drops of the tincture three times a-day. He almost immediately said he had not received so much benefit from any former medicine; and after continuing its use for a month he was discharged apparently well, not having had one feverish attack, and being fat, and with the countenance of health.

In a case too of intermittent fever (a girl eight years old), in which the fever had repeatedly recurred after being suspended by cinchona, the tincture of iodine was prescribed in a small dose three times a day, and the fever did not again recur.—Tr.

are improving; the iodine he considers to be an excellent tonic in other affections[g].

Mr. Callaway of the Borough, a surgeon of considerable talents and experience, has employed the tincture of iodine with the most happy results, in several cases of scrophulous enlargement of the glands, not only of the surface, but of the mesentery.]

LIQUOR POTASSÆ HYDRIODATIS.

Solution of Hydriodate of Potash.

Take of

Hydriodate of potass ..	36 grains (gr. 29.52 troy.)
Distilled water	1 ounce (7 dr. 52.5 gr. troy.)

This solution is still capable of dissolving iodine; and it may thus be made to form an iodureted hydriodate of potash.

Both these preparations, which may be given in the same manner as the tincture of iodine, are, like it, used for the cure of goître and of scrofula. In this latter case tonics are usually joined with them in the treatment.

[Dr. Gairdner prefers this preparation to the tincture: he generally begins with ten drops,

[g] [*London Medical and Physical Journal*, August, 1823.]

and gradually augments the dose to twenty, and rarely to twenty-five. By the use of this solution, or of the ointment above described, a soft bronchocele will be discussed in a month or six weeks; but those which are hard, and of old growth, require a longer period, and some cannot be altogether dispersed.

Dr. Wagner affirms that he has employed, with considerable success, an ointment of the hydriodate of potass, in the proportion of 18 grains to six drachms of lard, in a case of what he terms a *cancerous* tumor in the maxillary region: the patient was a male, aged 52 years, and the tumor could not be extirpated in consequence of his cacochymic condition. In less than a month after the commencement of the use of the ointment, the tumor had almost entirely disappeared.

Two cases of tumours of the bronchocele kind, where considerable benefit was derived from the use of the *ointment of hydriodate of potass*, according to M. Magendie's formula and mode of application, are described by M. Gunther of Cologne, in a letter to the Editor of the *Medicinisch-Chirurgische Zeitung*[h].]

[h] [*London Medical and Physical Journal*, March, 1823.]

UNGUENTUM POTASSÆ HYDRIODATIS.

Ointment of Hydriodate of Potash.

Take of

Hydriodate of potash .. ½ gros (gr. 29.5 troy.)
Hog's lard ..... 1½ ounce (11 dr. 48 gr. troy.)

This ointment is to be rubbed, morning and evening, on the bronchocele or enlarged scrofulous glands. The quantity for each friction must be about half a drachm (gr. 29. 5 troy.) At the end of eight days it may be increased to a drachm (gr. 59 troy,) and even more, according to the age of the individual, and the extent of the tumour.

[Dr. Gairdner recommends a dram of this ointment to be rubbed over the surface of the tumour night and morning; when the swelling, however, is painful, it is not necessary to rub in, but to follow a plan recommended by Scattigna, which consists in choosing a portion of the surface of the body where the skin is very tender and thin, and simply applying the ointment over night; for this purpose almost any part of the body which is habitually covered may be chosen; but the axilla or inner surface of the thighs close to the scrotum,

is to be preferred. Where the disease is entirely local, Dr. Gairdner recommends the external use of the iodine solely.]

It sometimes happens that tumours are completely removed by this application, which the saline solutions had not been able to entirely dissipate.

[In those cases above-mentioned, where the ointment of hydriodate of potass is indicated, Dr. Ure has found an ointment composed of one ounce of hog's lard and one drachm of iodide of zinc, a powerful external application. About a drachm of this ointment should be used in friction on the swelling once or twice a day[1].]

Sometimes, also, the treatment by friction is not alone sufficient; so that it is often necessary to join the two methods together. Generally the saline solutions would seem to be the most efficacious in the treatment of scrofula.

When the method by friction is used in goître, the action of the iodine is sometimes much assisted by emollient fomentations or leeches. Occasionally, after the first applications, the goître, instead of softening, becomes hard and slightly painful. Leeches commonly

[1] [*Dictionary of Chemistry*, 2d Edition.]

remove this local irritation; and then the effects of the iodine shew themselves in a very marked manner[k].

[k] Quære.—What have the leeches to do in producing this very marked effect?—Tr.

EXTRACTUM NUCIS VOMICÆ RESINOSUM.

Alcoholic Extract of the Nux Vomica.

In the year 1809, I laid before the first class of the French Institute a series of experiments which had conducted me to an unexpected result; namely, that an entire class of vegetables (the bitter strychnos) have the singular property of powerfully exciting the spinal marrow, without involving, except indirectly, the functions of the brain. I announced also, at the termination of my paper, that this property might be advantageously applied to the treatment of disease.[a]

[a] "Medicine will probably derive great advantages from the possession of a substance which will act especially on the spinal marrow; for it is well known that many very severe diseases have their seat in that part of the nervous system. The upas, however, does not exist in commerce; and should even experience shew that this vegetable substance is a valuable medicine, how is it to be procured? Experiments should be instituted for the discovery of a substance with properties analogous to those of the upas."

It was by such experiments that M. Delille and myself discovered the properties of the nux vomica and of the St. Ignatius's bean, and which led us to propose the

The last assertion, which was then conjectural, has been for several years verified by numerous experiments made at the bedside. Some time ago Dr. Fouquier published several cases of paralysis cured by nux vomica. I had also given the remedy with like success before I knew that Dr. Fouquier was engaged in similar researches; and it gave me great pleasure to see my work preceded by the communication of so esteemed a physician.

This circumstance, however, did not lead me to relax in my exertions; and I have seen the best effects follow the employment of the alcoholic extract of the nux vomica, not only in cases of both partial and general paralysis, but also in many other states of weakness of the constitution, both general and local.

MODE OF PREPARING THE ALCOHOLIC EXTRACT OF THE NUX VOMICA.

Take a determinate quantity of rasped nux vomica, exhaust it by repeated macerations in

medical employment of the resin of the nux vomica. See "*An Examination of the Action of certain Vegetables on the Spinal Marrow*," read to the Institute, on the 24th of April, 1809, by M. Magendie, Doctor of Medicine, Anatomical Assistant to the Faculty of Medicine. Paris, 1809.

alcohol of 40° (.817), and evaporate it slowly to the consistence of an extract.

Alcohol of much less strength may be used, but the product is proportionably less active.

EXTRACTUM NUCIS VOMICÆ RESINOSUM EXSICCATUM.

Dry alcoholic extract of the nux vomica.

Dissolve in water the alcoholic extract of the nux vomica, made by means of alcohol at 36° (.837); filtrate it, and evaporate on evaporating dishes, as in making the dry extract of cinchona.

PHYSIOLOGICAL PROPERTIES.

A grain (gr. 0.82 troy) of this extract, absorbed from any part of the body, or mixed with food, promptly destroys a dog of considerable size, by inducing paroxysms of tetanus, which by their continuance stop the respiration long enough to produce complete asphyxia.

When the dose is much stronger, the animal appears to perish entirely from the action of the substance on the nervous system: as M. Ségalas has lately demonstrated. (See

the *Journal de Physiologie Expérimentale*, for October, 1822.)

If an animal be touched whilst under the action of this substance, it experiences a commotion similar to that of a strong electrical shock; and this takes place every time the contact is renewed.

Dividing the spinal marrow behind the occiput, and even complete decollation, does not prevent these effects, nor even their continuance for some time. This characteristic action of the alcoholic extract of the strychnos distinguishes it from all other exciting substances at present known.

On dissection no lesion is discovered which can indicate the cause of death.

ACTION OF THE ALCOHOLIC EXTRACT OF THE NUX VOMICA ON THE HUMAN BODY WHEN IN HEALTH.

The action of the alcoholic extract of nux vomica on the healthy human body is identical with that above described; and if the dose be sufficiently large, death speedily follows with the same symptoms. Dissection does not shew any apparent lesion of structure, the traces of the asphyxia which caused or accom-

panied death being alone observable; as I had an opportunity of verifying in the case of a woman who died after taking this substance as a poison.

ITS ACTION ON THE UNHEALTHY BODY.

The effect is still the same on man when affected with paralysis; but what is very remarkable, it is particularly manifested in the paralysed parts: it is there that the tetanic commotions occur, as well as a creeping sensation, which announces the action of the remedy; a local perspiration also breaks out in the same parts, which is not observed in the rest of the body. In cases of hemiplegia submitted to the action of the nux vomica, the halves of the body exhibit a striking contrast; for whilst the healthy side is at rest, the other is violently agitated; tetanic shocks soon succeed, and an abundant perspiration breaks out. In one female the affected side was covered with a peculiar eruption, when the opposite afforded no trace of it: even the two sides of the tongue differ; a decidedly bitter taste being perceived on the one side, whilst the other presents nothing similar.

If a larger dose be given, the two sides of the body participate, but unequally, in the

tetanic effect; so that the patient is sometimes thrown out of bed by the violence of the paroxysm.

The alcoholic extract of the nux vomica, when given in very small doses, has not, like many other remedies, any perceptible effect immediately; and some days pass over before its advantageous or noxious properties can be appreciated.

CASES IN WHICH THE ALCOHOLIC EXTRACT OF THE NUX VOMICA MAY BE EMPLOYED.

These are, all diseases attended by debility whether it be local or general; and paralyses of all kinds, general or partial. Mr. Edwards cured a case of amaurosis with palsy of the upper eyelid by means of the nux vomica; and I have seen very excellent effects from the same remedy in marked cases of weakness of the genital organs, incontinence of urine, &c. I have also given the resin of the nux vomica in cases of sluggish digestion, and in states of extreme debility attended by an irresistible disposition to sleep.

MODE OF EXHIBITING THE RESIN OF NUX VOMICA.

This remedy is best given in the form of

pills, when the practitioner wishes to produce the tetanic commotions; that is to say, when he wishes to have its sensible effect. If each pill contain a grain of the extract (gr. 0.82 troy), one or two may be given at first, and the dose be daily augmented until the desired effect be produced; the medicine must then be discontinued, to avoid accidents. It is better to give the pills in the evening, because night is the best time for observing the phenomena which we wish to produce.

It is sometimes necessary to increase the dose to from 24 to 30 grains (from gr. 19.68 to 24.6 troy,) in the day, before the tetanic convulsions are produced: but generally from 4 to 6 grains (gr. 3.28 to 4.92 troy,) are sufficient.

If the exhibition of the remedy have been accidentally interrupted for some days, it is necessary to recommence with the smaller doses, and to increase them again gradually, as before.

When it is desirable to produce only the slow effects of the remedy, a grain (0.82 troy,) or a grain and a half (gr. 1.23 troy,) in the day, is sufficient; or the following tincture may be used: —

TINCTURA NUCIS VOMICÆ.

Tincture of Nux Vomica.

Take of

Alcohol of 36° (.837) .... 1 ounce (7 dr. 52.56 gr. troy.)
Dry extract of nux vomica, 3 grains (2.46 gr. troy.)

This tincture is to be given by drops, in mixture or in drink, whenever the alcoholic extract in substance is indicated.

STRYCHNINA[a]. STRYCHNIUM. STRYCHNIA.

Strychnine.—Strychnin.

THE alcoholic extract of nux vomica, nux vomica in substance, St. Ignatius's bean[a], and the celebrated Java poison, all owe their active effects on man and on animals to the existence, amongst their elements, of a peculiar vegetable alkali, recently discovered by MM.

[a] [The chemical components of the *strychnos Ignatii*, or *St. Ignatius's bean*, are as follow:—1. Fatty, butyraceous matter — 2. wax — 3. igasurate of strychnine — 4. yellow colouring matter—5. much gum—6. bassorine — 7. a little fecula and woody fibre. Those of the *strychnos nux vomica*, are similar to the above, except that the strychnine is in a less proportion, and the colouring and fatty matters in a greater. The *strychnos colubrina* is also similarly constituted to the *strychnos Ignatii*, except that it contains much more fatty and colouring matter, less strychnine, and a considerable quantity of woody fibre, in place of the bassorine and starch.—*Pelletier and Caventou.*]

Pelletier and Caventou[b]: I have proved this fact by direct experiments[c].

MODE OF PREPARING STRYCHNINE.

Add a solution of liquid subacetate of lead to a solution of alcoholic extract of the nux vomica in water, until no more precipitate be thrown down; the foreign matters being thus separated, the strychnine remains in solution with a portion of colouring matter, and sometimes an excess of acetate of lead. Separate the lead by sulphuretted hydrogen; filtrate it, and boil with magnesia, which will unite with the acetic acid, and precipitate the strychnine. Wash the precipitate in cold water; redissolve it in alcohol, to separate the excess of magnesia; and by evaporating the alcohol, the strychnine is obtained in a state of purity. If it be still not perfectly white, it must be redissolved in acetic or hydrochloric acid, and reprecipitated by means of magnesia.

[b] The papers on this subject are in the 8th, 9th, and 10th volumes of the *Annales de Chimie et Phys.* It is supposed that in the native state the strychnine is in union with a new acid, called, by MM. Pelletier and Caventou, Igasuric acid, from the Malay name of the St. Ignatius's bean.—Tr.

[c] *Annales de Chimie et Phys.* tom. x. p. 176. 1819.—M.

Strychnine obtained by crystallization from an alcoholic solution which has been diluted by means of a small quantity of water, and left to itself, appears under the form of microscopical crystals, forming four-sided prisms, terminated by pyramids with four flattened or depressed faces. Crystallized rapidly, it is white and granular; it is insupportably bitter to the taste, and gives an after-sensation similar to that produced by certain metallic salts; it has no smell; it is not changed by exposure to the air; it is neither fusible nor volatile, for when submitted to the action of heat, it does not fuse until the moment of its decomposition and carbonization; it is decomposed by a degree of heat inferior to that which destroys most vegetable substances. Exposed to the naked fire, it swells, becomes black, and gives out an empyreumatic oil, a little water, and acetic acid, and also carbonic acid gas, and carbonated hydrogen; distilled with deutoxide of copper, it gives out much carbonic acid, and only slight traces of azote.

It is composed then of oxygen, hydrogen, and carbon; the azote not appearing to form a part of its elements. Although strychnine has so strong a taste, it is scarcely soluble in water; 100 grammes (gr. 1544.4 troy,) of water, at the temperature of 10° (50° Fah.) dis-

solved no more than gr. 0.015 (gr. 0.012 troy); 6667 parts of water, therefore, are required to dissolve it at this temperature: boiling water dissolves a little more than double, gr. 0.04 (gr. 0.0324 troy) being dissolved in 100 grammes (gr. 1544.4 troy) of boiling water. Strychnine then is soluble in 2500 parts of boiling water. It is remarkable that a solution of strychnine made in the cold, and containing therefore only $\frac{1}{6000}$th part of its weight, may be diluted to 100 times its volume by means of water, and still retain a very decidedly bitter taste. The principal character of strychnine, however, consists in its forming neutral salts when united with acids.

It would appear from some recent experiments by M. Pelletier, that the nux vomica contains two alkaline substances; the one strychnine, of which we have just treated, the other brucine, previously found in the *angustura spuria* by MM. Pelletier and Caventou. When, by following the process above mentioned for the separation of strychnine, care is taken to crystallize the substance several times in alcohol, it is pure and deprived of brucine; the brucine being much more soluble in alcohol, and crystallizing with difficulty, remains in the alcoholic *mother waters*. The presence of brucine, however, in strychnine, is by no means a great incon-

venience, as the brucine is possessed of properties similar to those of strychnine; only it is less active.

M. Henry, *Chef de la Pharmacie Centrale*, has given a new process for the extraction of strychnine. It consists in boiling the nux vomica in water, and evaporating the decoction until it has the consistence of syrup; lime is then added, which unites with the acid, and sets the strychnine at liberty; by means of alcohol it may then be separated from the lime. The strychnine contained in the alcohol is subsequently obtained by evaporation; and is rendered more pure by being redissolved in alcohol, and again submitted to crystallization.

M. Henry points out another plan for purifying strychnine, namely, combining it with nitric acid. The salt is to be afterwards crystallized, after its colour has been discharged by means of animal charcoal; finally, the strychnine may be precipitated from it by ammonia. We may observe, that at the time when M. Henry published his process, it was not known that brucine existed in the nux vomica along with strychnine; so that in the detail of this process there is no mention made of the separation of the two alkalies: it will be readily seen, however, that whenever the strychnine has been obtained by crystal-

lization, it will be free from brucine, or at least will contain but little of it; whilst, when obtained by precipitation, it will be much mixed with brucine, and consequently be possessed of less action on the animal economy.

It is unfortunate that the St. Ignatius's bean should be so scarce in commerce; for as this grain contains strychnine almost entirely free from brucine, as M. Pelletier has shewn, it would be highly advantageous to employ it for the preparation of pure strychnine.

ACTION OF STRYCHNINE ON MAN AND ON ANIMALS.

The action of strychnine on man and on animals is exactly like that of the alcoholic extract of nux vomica; it is, however, much more active; an eighth of a grain (gr. .1025 troy) is sufficient to kill a large dog, and a quarter of a grain (gr. .205 troy) often produces very marked effects on the human body when in health.

[M. Andral, who is a good pathologist and careful observer, has lately detailed several cases of paralysis, in which strychnine or brucine was employed; the results of these cases have led him to conclude, 1st, That pure strychnine acts upon the human subject like

the extract of nux vomica, but with much greater intensity. 2dly, That the action of strychnine is so violent, that it ought not to be employed, except with the greatest precaution. Its effects he found to vary in a remarkable manner, according to the idiosyncrasy of the individual; thus in one, a twelfth of a grain (gr. .0683 troy) was sufficient to produce serious symptoms, whilst in another the dose could be carried, with almost impunity, to more than a grain (than gr. 0.82 troy). 3dly, That brucine acts upon man as upon animals. Although much less active than strychnine, since it may be commenced with, without inconvenience, in the dose of half a grain (gr. 0.41 troy), it may be advantageously substituted for the alkali of the nux vomica. 4thly, That both strychnine and brucine are more or less efficacious, according to the kind of paralysis for which they may be exhibited. When employed in those cases where paralysis is connected with an inflammatory condition of the brain or spinal marrow, M. Andral thinks, but without assigning any grounds for his supposition, that they may probably aggravate the symptoms. They are said to be more especially useful in that kind of paralysis, the cause of which cannot be referred to any injury of the nervous centres; particularly to that species to which individuals are liable

who meddle with the preparations of lead; nine cases of this nature are related which were treated with one or other of these alkalies; of these, six were cured or relieved[d].]

CASES IN WHICH STRYCHNINE MAY BE EMPLOYED.

The cases which authorize the use of strychnine, are those before pointed out as benefited by the resin of the nux vomica; it would indeed be unnecessary to use strychnine if the extracts of the nux vomica were always made in the same manner, and if they were not liable to vary in strength according to the mode of preparation.

Strychnine then is generally the most proper preparation, because its properties are constant, and its action uniform.

[We are informed by M. Theophilus Cramer of Bonn, who lately published an Essay, entitled "*Strychnii vis ac efficacia in corpus animale,*" that his friend M. Dieffenbach has recently administered it with considerable benefit in a case of paralysis. M. Magendie is also said to have found it singularly

[d] [*Journal de Physiologie*, Juillet, 1823.]

useful in the case of an old man who was labouring under considerable muscular debility [e].]

MODE OF EMPLOYING STRYCHNINE.

It may be made into pills, each pill containing one-twelfth or one-eighth (gr. .0683, or .1025 troy) of a grain; and the following formula may be used: —

PILULÆ STRYCHNINÆ.

Pills of Strychnine.

Take of

Very pure strychnine	2 grains (1.64 gr. troy.)
Conserve of roses	½ gros (29.5 gr. troy.)

Mix accurately, and make into twenty-four very equal pills, and silver them, to prevent them sticking to each other [f].

[e] [*Quarterly Journal of Foreign Medicine*, &c. July, 1823.]

[f] We are accustomed in England to prevent pills from sticking together by rolling them in liquorice powder, or magnesia, or flour; the old plan of gilding and silvering pills is very inconvenient, for if it be perfectly done, the pills will be effectually preserved from the action of the stomach.—Tr.

TINCTURA STRYCHNINÆ.

Tincture of Strychnine.

Take of

Alcohol at 36° (.837) 1 ounce (ʒvij. and gr. 52.56, troy.)
Strychnine ····· 3 grains (2.46 gr. troy.)

From six to twenty-four drops of this tincture may be administered in mixture or in drink.

I have often used the following as a stimulating mixture : —

MISTURA STRYCHNINÆ.

Mixture of Strychnine.

Take of

Distilled water ····· 2 ounces (1 oz. 7 drs. 45 grs. troy.)
Very pure strychnine 1 grain (0.82 gr. troy.)
White sugar ····· 2 gros. (118.0 gr. troy.)

A dessert spoonful to be taken every morning and evening.

EMETINA. EMETA.

Emetine.

In a memoir laid before the Academy of Sciences in 1817, M. Pelletier and myself established, by a series of chemical and physiological experiments, that the different species of ipecacuanha owe their emetic properties to a particular immediate principle, which M. Pelletier has called *emetine*. This substance is much more active than ipecacuanha; and as it has neither its disagreeable taste nor nauseous odour, we are of opinion that it may be advantageously used for ipecacuanha on all occasions.

PREPARATION OF COLOURED EMETINE.

Powder the ipecacuanha, and digest it in ether at 60 degrees (.720) to dissolve the fatty odorous matter. When the powder yields nothing more to the ether, exhaust it again by means of alcohol. Place the alcoholic tinctures in a water bath, and redissolve the residue in cold water. It thus loses a portion of wax and a little of the fatty matter which still remained. It is only necessary further to macerate it on carbonate of magnesia, by

which it loses its gallic acid, to redissolve it in alcohol, and to evaporate it to dryness.[a]

[Or digest ipecacuanha root first in ether, then in alcohol. Evaporate the alcholic solution to dryness, redissolve in water, and drop in acetate of lead. Wash the precipitate, and then, diffusing it in water, decompose by a current of sulphuretted hydrogen gas. Sulphuret of lead falls to the bottom, and the emetine remains in solution. Dr. Ure asserts, that by this process emetine is obtained pure; this is, however, erroneous, as will be readily seen on comparing the chemical qualities common to this and the above preparation, with those exhibited by pure emetine, as detailed in the next article.]

Emetine, when thus prepared, is not quite pure, as we at first thought. But it may be used with advantage as a medicine in this state[b]. It appears in the form of transparent scales, of a reddish brown colour. It is nearly devoid

[a] [By a similar process to the above, M. Boullay has lately obtained from the roots, leaves, flowers, and seeds of the *viola odorata*, an active, alkaline, bitter, and acrid principle, similar to the emetine from ipecacuanha, and which he proposes to denominate, *Emetine of the violet*, *indigenous emetine*, or *violine*. According to M. Orfila, this substance is possessed of highly poisonous qualities.—*Journal de Pharmacie*, Janvier 1824.]

[b] See the following article on *pure emetine*.—M.

of odour. It has a bitter, but not nauseous taste. It is capable of supporting the heat of boiling water without undergoing change; is very deliquescent, soluble in water, and incrystallizable.

PHYSIOLOGICAL PROPERTIES OF EMETINE.

Emetine, when given to dogs and cats, in a dose of from half a grain to two or three grains (gr. 0.41 to 1.64 or 2.46 troy), produces vomiting, which is sometimes followed by a long sleep. In a larger dose (10 grains, for instance [gr. 8.2 troy]), it occasions, in dogs, repeated vomitings, after which the animal falls asleep; but instead of awaking in a state of health, as in the case when emetine is given in a weak dose, it usually dies in twenty-four hours. It is found, on dissection, that death is produced by violent inflammation of the substance of the lungs, and of the mucous membrane of the alimentary canal, extending from the cardia to the anus. These phenomena have the greatest analogy with those which are produced by emetic tartar, and which I described, in 1813, in a paper entitled, "*On the influence of emetic tartar on man and on animals.*"

The result is still the same if the emetine be thrown into the jugular vein, or be simply absorbed from any part of the body.

ACTION OF EMETINE ON MAN IN A STATE OF HEALTH.

Two grains (gr. 1.64 troy) of emetine, swallowed fasting, produce continued vomiting, followed by a decided disposition to sleep. Even a quarter of a grain (gr. 0.205 troy) is sometimes sufficient to produce nausea and vomiting.

ACTION OF EMETINE ON MAN IN A STATE OF DISEASE.

Emetine acts in this case exactly in the same way as it does on man in a state of health. It vomits and purges, as in the former; in addition, however, it is easy to prove that it exerts a happy influence on catarrhal affections, especially when chronic[c].

The cases in which emetine may be employed are exactly those in which ipecacuanha is indicated.

MODE OF USING EMETINE.

To produce vomiting, 4 grains (gr. 3.28 troy) may be dissolved in any vehicle, and given in divided doses, repeated at short intervals.

[c] See *Chemical and Physiological Researches on Ipecacuanha*, by MM. Magendie and Pelletier. Paris, 1817.—M.

If the whole of so soluble a medicine be given at once, it is entirely expelled by the first vomiting, and no other action is produced [d].

The following mixture may also be used —

MISTURA EMETINÆ VOMITORIA.

Emetic Mixture of Emetine.

Take of

Emetine ..... 4 grains (gr. 3.28 troy.)
A light infusion of orange flowers ..... 2 ounces (1 oz. 7 dr. 45 gr. t.)
Syrup of orange flowers ½ an ounce (dr. 3.56 troy.)

A dessert spoonful to be given every half hour.

In chronic pulmonary catarrhs, in hooping cough, in chronic diarrhœa, the fol-

[d] This is a curious and somewhat improbable circumstance; for although a large dose of the powdered ipecacuanha produces scarcely more effect than a small one, and probably for the reason given by M. Magendie above, yet this is supposed to arise from the powder being a bulky and insoluble substance. The truth of this explanation is supposed to be proved by the fact, that the same exemption from an increase of effect does not follow when emetic tartar is given in a large dose; its emetic power increasing with the dose. By analogy, a similar increase of effect might be when an increased dose of emetine is given; it being in solution, and in as small a bulk as in the case of emetic tartar. But M. Magendie is not a man to speak at random.—Tr.

lowing lozenges may be advantageously employed, instead of the common ipecacuanha lozenges: —

PASTILLI EMETINÆ PECTORALES.

Pectoral Lozenges of Emetine.

Take of

Sugar	4 ounces (3 oz. 7 dr. 30 gr. troy.)
Coloured emetine ..	32 grains (gr. 26.24 troy.)

Form into lozenges of 9 grains (gr. 7.38 troy) each.

It is common to colour these lozenges red, to distinguish them from those of ipecacuanha. A little carmine may be used for this purpose.

One of these lozenges may be given every hour: if oftener, they will excite nausea.

PASTILLI EMETINÆ VOMITORII.

Emetic Lozenges of Emetine.

Take of

Sugar	2 ounces (1 oz. 7 dr. 45 gr. troy.)
Emetine	32 grains (gr. 26.24 troy.)

Form into lozenges of 18 grains (gr. 14.76 troy) each.

One of these lozenges, taken fasting, is com-

monly sufficient to make a child vomit; — three or four do the same thing promptly for adults.

[M. Lerminier, of the Hospital *La Charité*, has frequently administered emetine in this form, and, from his observations, he asserts that ten or twenty grains of the root of ipecacuanha are adequately represented, so far as regards intensity of action, by one or two grains of emetine. The convenient and agreeable form under which emetine may be administered, entitles it to a preference over ipecacuanha in substance: added to which several spurious sorts of ipecacuanha are frequently passed off in commerce, and, consequently, considerable disappointment occasioned in the mind of the practitioner. The employment of the active principle of emetine would of course preclude these unpleasant occurrences[e].]

The syrup of ipecacuanha of the shops may be replaced by the following: —

[e] [*Clinique Médicale*, &c. Par M. Andral. Paris, 1828.]

SYRUPUS EMETINÆ.

Syrup of Emetine.

Take of

Simple syrup	1 pound (15 oz. 6 dr. 1 gr. troy.)
Coloured emetine ..	16 grains (gr. 13.12 troy.)

This syrup may be employed under the same circumstances, and in the same manner, as the syrup of ipecacuanha.

EMETINA PURIFICATA.

Pure Emetine.

EMETINE, as treated of in the preceding article, is not in a state of purity. It is to pure emetine what moist sugar is to the white and crystallized. M. Pelletier, in a work, the chemical part of which is not yet finished, shews how the active matter of the different species of ipecacuanha may be isolated. This matter is a new vegetable alkali, the principal characters of which are as follow:

PREPARATION OF PURE EMETINE.

To obtain pure emetine, it is necessary to substitute calcined magnesia for the carbonate, used in the former process[a]; a sufficient quantity of this base being added to take up the free acid which exists in the liquor, and unite with that which is combined with the emetine.

The emetine, thus isolated, and rendered less

[a] See above, page 60.—M.

soluble, is precipitated in combination with the excess of magnesia. This magnesian precipitate, after being washed by means of a little very cold water, to separate the colouring matter, which is not combined with the magnesia, must be carefully dried and digested in alcohol, which dissolves the emetine. After the emetine has been separated from the alcohol by evaporation, it must be redissolved in a diluted acid, and blanched by digestion with purified animal charcoal. It must then be precipitated by a salifiable base.

The waters used to wash the magnesian precipitate still contain emetine, which may be separated by a second series of operations.

Pure emetine is white, pulverulent, and unalterable by the air; although coloured emetine is deliquescent. It is scarcely soluble in water, but is very easily dissolved in ether and in alcohol. Its taste is slightly bitter. It restores the blue of turnsol when reddened by an acid. It is dissolved by all the acids, the acidity of which it diminishes, but without entirely destroying it. It resembles veratrine, in forming evidently crystallizable saline combinations with acids. It may be precipitated from these combinations by the gall-nut, like the alkalies of the different species of cinchona.

ACTION OF PURE EMETINE ON MAN AND ON ANIMALS.

This action is similar to that of coloured emetine; but it is much more energetic. Two grains (gr. 1.64 troy) are sufficient to destroy a large dog. In one case the $\frac{1}{10}$th of a grain (gr. 0.051 troy) produced vomiting in a man of 85 years of age. It is true, however, that he was easily made to vomit.

MODE OF PRESCRIBING PURE EMETINE.

For some time past I have used the following lozenges:—

PASTILLI EMETINÆ PURIFICATÆ.

Lozenges of Pure Emetine.

Take of
Sugar ..... 4 ounces (3 oz. 7 dr. 30 gr. troy.)
Pure emetine .... 8 grains (gr. 6.56 troy.)
Form into lozenges of 9 grains (gr. 7.38 troy) each.

To produce vomiting, a grain (gr. 0.82 troy) of pure emetine may be given in a draught; being first dissolved in acetic or sulphuric acid, on account of its being so little soluble in water.

The following formula may be employed:

HAUSTUS EMETINÆ PURIFICATÆ VOMITORIUS.

Emetic Draught of pure Emetine.

Take of
Infusion of the flowers of
the Tilia ..... 3 ounces (2 oz. 7 dr. 37 gr. troy.)
Pure emetine dissolved in
a sufficient quantity
of nitric acid ..... 1 grain (gr. 0.62 troy)
Syrup of marshmallows 1 ounce (7 dr. 52.56 gr. troy.)

A dessert-spoonful to be taken every quarter of an hour until vomiting be produced.

The following syrup may also be prescribed.

SYRUPUS EMETINÆ PURIFICATÆ.

Syrup of Pure Emetine.

Take of
Simple syrup ..... 1 pound (15 oz. 6 dr. 1 gr. troy.)
Pure emetine ..... 4 grains (gr. 3.28 troy.)

To be given by tea-spoonfuls.

[CYTISINA.

Cytisine.

This is the name of an immediate vegetable principle, bearing some analogy with emetine. It was discovered by MM. Chevallier and Lassaigne in the seeds of the *cytisus laburnum*[a], which are indebted to it for their emetic and purgative properties.

PREPARATION OF CYTISINE.

The seeds of the *cytisus laburnum* must be digested in hot alcohol, the liquor evaporated, the residuum dissolved in water, and the solution precipitated by the acetate of lead: the lead is separated from the filtered liquor by sulphuretted hydrogen, and the fluid again filtered and evaporated.

[a] [The following are the chemical components of those seeds: — 1. A greenish fatty matter, soluble in water and alcohol; 2. A green colouring matter; 3. *Cytisine;* 4. Woody fibre; 5. Albumen; 6. Malic and phosphoric acids; 7. Malates of potass and lime.—*Chevallier and Lassaigne.*]

PROPERTIES OF CYTISINE.

Cytisine is incrystallizable, of a brownish yellow colour, and bitter and nauseous taste; it is slightly deliquescent, very soluble in water and in dilute alcohol, and insoluble in ether. The acetate of lead does not render its aqueous solution turbid, whilst the subacetate slightly precipitates it: the infusion of galls occasions a yellowish white, flocculent precipitate, and the alkalies communicate to it a greenish yellow tint; the solution of gelatine does not precipitate it.

ACTION OF CYTISINE ON THE ANIMAL ECONOMY.

Cytisine, in the dose of from 50 to 100 *milligrammes* (gr. 0.77 to 1.54 troy,) acts as an emetic or purgative: at a stronger dose it gives place to serious accidents, which seem to bear some relation with those produced by emetine.

MM. Chevallier and Lassaigne have likewise discovered in the flowers of the *arnica montana* a bitter, nauseous substance, resembling cytisine, and to which this plant, without doubt, is indebted for its emetic properties.

Cytisine has not hitherto been employed in medicine.]

QUININA ET CINCHONINA.

QUINIA, QUINA, ET CINCHONIA.

Quinine and Cinchonine, or Cinchonin.

MM. Laubert, Streuss of Moscow, and Gomez of Lisbon, published, some years ago, and about the same time, very interesting works on the cinchona; but they did not at all agree with respect to the substance in which they thought that the febrifuge property resided. MM. Pelletier and Caventou, led, by their preceding researches, to believe in the existence of such a substance, endeavoured to find it; and following the same principles which had so happily led to the discovery of strychnine, emetine, &c., they obtained a substance which they recognized as that which M. Gomez had described under the name of *cinchonine*[a]: they discovered also that it was alkaline—a very important property which had escaped the Lisbon chemist.

They obtained the *cinchonine* by operating

[a] [The term *cinchonin* was, however, first applied to this substance by Dr. Duncan, jun.]

on the grey cinchona, the *cinchona condaminea*[b] (they add an *e* to *cinchonin*, to make the word harmonize with the names of the other vegetable alkalies). The yellow bark (the *cinchona cordifolia*[c]) furnished an alkali, which, although it resembled the first in many points, differed in too many important ones to allow of its being confounded with it. They called it *quinine*.

The analysis of the red bark (*cinchona oblongifolia*[d]) followed. It was an interesting

[b] [The *cinchona condaminea* yields on analysis the following constituents: — 1. *Cinchonine* united with Kinic acid, (the cinchonine forming 0.2 per cent of the whole bark); 2. Green fatty matter; 3. Red colouring matter, very sparingly soluble; 4. Red colouring matter soluble (tannin); 5. Yellow colouring matter; 6. Kinate of lime; 7. Gum; 8. Fecula; and, 9. Ligneous fibre.— *Pelletier and Caventou.*]

[c] [The *cinchona cordifolia* yielded on analysis: — 1. Yellow, odorous, adipocire; 2. Yellow colouring matter; 3. Tannin, which turns iron of a green colour; 4. Red of cinchona, more abundant than in the red bark; 5. Kinate of *quinine*, with very little *cinchonine*, (the quinine, according to Pelletier and Caventou, forming 0.9 per cent of the bark, and according to Voreton 1.4); 6. Fecula; 7. Woody fibre; and, 8. Kinate of lime.— *Ibid.*]

[d] [The *cinchona oblongifolia* consists of: — 1. Adipocire; 2. Yellow colouring matter; 3. Tannin; 4. Red of cinchona (very abundant in this bark); 5. Kinates of

question to determine whether this species, which is considered by many medical men as eminently febrifuge[e], contained cinchonine or quinine, or a third variety of alkali. They did not dream, however, of obtaining, not only cinchonine, in all respects like that of the grey bark, in threefold quantity, but almost twice as much quinine as they had been able to extract from an equal quantity of yellow bark. This quinine, however, had nearly all the characters of the other, and only shewed some shades of difference in its greater fusibility, and the appearance of its sulphate.

Ulterior experiments, made on large masses, have shewn, indeed, that quinine and cinchonine exist simultaneously in all the three species of bark; but the cinchonine is, relative to the quinine, in greater quantity in the

cinchonine and *quinine*, (100 parts of the bark yielding 0.8 of cinchonine, and 1.7 of quinine); 6. Fecula; 7. Woody fibre; 8. Kinate of lime.—*Ibid.*]

[e] This is not the common opinion; at least so says Mr. Thomson, on the authority of Zea and Mutis, in his Dispensatory. We side, however, from theory, with M. Magendie's account of the eminent qualities of the red bark. Its containing so large a quantity of both cinchonine and quinine is apparently decisive of the question. Still Mr. Thomson says, " its taste is much less bitter," &c.—Tr.

grey bark; whilst, in the yellow bark, the quinine so predominates, that the presence of the cinchonine might well have escaped notice when small quantities were operated on.

PREPARATION OF CINCHONINE AND QUININE.

Boil the bark in alcohol until it loses all its bitterness; evaporate to dryness in a water bath; dissolve the alcoholic extract entirely in boiling water, strongly acidulated with hydrochloric acid; add an excess of calcined magnesia, which, after boiling some minutes, will fix all the red colouring matter, and make the liquid clear. When cold, filtrate and wash the magnesian precipitate with cold water; dry it on a stove; separate all the bitterness by repeated digestions in boiling alcohol; mix the alcoholic liquors, and the cinchonine will crystallize as the fluid cools. The cinchonine, which is thus obtained, still contains a green fatty matter, which may be separated by solution in a very weak acid. If the acid be too strong it will dissolve a part of the fatty matter, and the intended object will be thus defeated.

Quinine may be obtained from the yellow bark by a similar process to the one described above.

It has been said that both cinchonine and

quinine are to be found in all the three species of bark. They may be procured by one operation, as follows :—

After having obtained directly the sulphate of quinine, by the process described below, collect the mother waters and the washings of that operation; these contain the sulphate of cinchonine. It is probable that the sulphate has been rendered incrystallizable by the small quantity of fatty matter which is contained in these liquors. Decompose these liquors by magnesia or lime. Dissolve the quinine and cinchonine which they contain by digesting the magnesian precipitate, when washed and well dried, in boiling alcohol. If the spirit be sufficiently charged, the cinchonine, which predominates, will crystallize; if it do not, further concentration is required. To purify the cinchonine which is thus obtained, it must undergo a recrystallization. For this end, dissolve it in a sufficient quantity of boiling alcohol; it will thus become very pure. The alcoholic mother waters still contain quinine, which may be separated by evaporation[f].

[f] [M. Carzoneri has lately obtained from the *æsculus hippocastanum*, by a process analogous to the above, an alkaline principle to which he has given the name of *esculine*: this principle is supposed to contain all the febrifuge virtues for which the æsculus has been celebrated.—*Journal de Pharmacie*, Nov. 1823.]

CHEMICAL PROPERTIES OF CINCHONINE.

Cinchonine is white, translucent, crystallizable in needles, and soluble only in 700 parts of cold water. The latter circumstance occasions its trifling sapidity. If it be dissolved in alcohol, or rather in an acid, its flavour is a powerful bitter, which exactly resembles that of the grey bark. Cinchonine is only dissolved in very small quantity by the fixed oils, the volatile oils, and sulphuric ether; it forms more or less soluble salts with acids. Cinchonine is volatilized at a certain temperature: the largest portion of the substance, it is true, is destroyed during the operation, but still a sensible portion escapes the decomposing action of the caloric.

[MM. Pelletier and Caventou have asserted that cinchonine consists of oxygen, hydrogen, and carbon, and that it is deficient in nitrogen. Mr. Brande, however, has lately found that this assertion is erroneous; the following being the results of two experiments which he instituted:

Carbon	80.20	Carbon	78.4
Nitrogen	12.85	Nitrogen	14.6
Hydrogen	6.85	Hydrogen	7.5
	99.90		1 00.5

Several experiments were made for the purpose of detecting the presence of oxygen, but no traces of it were discoverable[g].]

The sulphate and acetate of cinchonine are used in medicine. The first of these salts is very soluble in water; the second is much less so, but an excess of acid dissolves it with tolerable facility.

CHEMICAL PROPERTIES OF QUININE.

Quinine is white and incrystallizable; it is as little soluble in water as cinchonine; it is much more bitter, however, to the taste. Its salts also are in general more bitter; they are distinguished by a pearly aspect. Quinine is very soluble in ether, while cinchonine is very little so. This difference not only serves to distinguish these bases, but also to separate them when united.

[Quinine differs likewise from cinchonine in the proportions of its elements; whilst no oxygen can be detected in the latter, it is contained, in nearly as large a proportion as hydrogen, in the former. The following, according to Mr. Brande, are nearly its ultimate components:

g [*Journal of Science*, &c. No. 32.]

Carbon	73.80
Nitrogen	13
Hydrogen	7.65
Oxygen	5.55
	100]

QUININÆ SULPHAS.

Sulphate of Quinine.

M. Henry the younger has lately made known an expeditious and cheap process for obtaining directly the sulphate of quinine. He digests, repeatedly, in hot water, acidulated by sulphuric acid (6 or 8 grammes [gr. 92.66 or gr. 123.55 troy] to each kilogramme [oz. 32.17 troy] of distilled water). He blanches the liquors by means of hot lime, and washes the precipitate to separate the excess of lime. He repeatedly digests this precipitate, when well drained, in alcohol at 36° (.837). He then obtains, by distillation, a brown viscid matter, which becomes brittle when cold, and is very bitter. He digests it in hot water, acidulated by sulphuric acid, and the liquor, when cold, gives perfect crystals of pure sulphate of quinine. He has not succeeded so well in extracting the sulphate of cinchonine from the grey bark by this mode of preparation.

The sulphate of quinine obtained in this

way, is in the form of white crystals, which are entirely soluble in water; little so, however, in cold, but more so in boiling, and especially in weakly acidulated, water[h].

QUININÆ SUPERSULPHAS.

Acid Sulphate of Quinine.

M. Robiquet, by proceeding somewhat differently, has obtained a sulphate, the characters of which are not the same as those of the preceding. His sulphate is in solid transparent prisms, of a flattened quadrangular form, well terminated, and soluble even in the cold. M. Robiquet found, by comparative trials, that this difference arises from the prismatic sulphate being acid and the other alkaline. He is certain of the stability of these characteristics; for the salts preserve them without alteration after several crystallizations, al-

[h] Dr. Paris gives the above process with some variation. He directs two pounds of the powdered bark to be boiled for half an hour in sixteen pints of distilled water, acidulated with two fluid ounces of sulphuric acid. The quantity of lime recommended is half a pound, or enough to render the solution of a dark brown, and to produce a reddish brown precipitate. He says that the two pounds yield ʒv. or ʒvi. of the sulphate; 8 grains being equivalent to an ounce of bark.—Tr.

though the subsulphate lost each time a small portion of its acid. M. Robiquet found, besides, that he constantly obtained the acid sulphate, only, when, in digesting the quinine in water, he could not succeed in dissolving it without a slight excess of acid; whilst, if he made use of alcohol, as the quinine is soluble in that fluid, it is more workmanlike to add only the quantity of acid which is necessary for saturation.

At present the neutral sulphate has been obtained only in solution.

COMPARATIVE ANALYSIS OF THE TWO SULPHATES OF QUININE.

M. Robiquet has given an analysis of the two sulphates in the work just quoted; but as he found that the subsulphate lost a portion of its acid during each crystallization, he has given the composition of this salt both after the first and third crystallization.

100 parts of acid sulphate of quinine contain	of acid	19.1	82.6
	of quinine..	63.5	
100 parts of subsulphate, first crystallization	of acid	11.3	90.3
	of quinine..	79.0	
100 ——————— third crystallization	of acid	10.0	99.9
	of quinine..	89.9	

QUININÆ ACETAS.

Acetate of Quinine.

The characteristic of this salt is the great facility with which it crystallizes; it is sparingly soluble in the cold, even with an excess of acid. It thickens in a mass when exposed to cold.

ACTION ON ANIMALS.

As soon as these alkalies were discovered, M. Pelletier, one of the discoverers, sent to me a certain quantity that I might study their effects on animals. I soon found that neither these alkalies nor their salts were in any respect poisonous, and indeed that they had no sudden appreciable action. This gave a sufficient assurance that they might be tried on man.

ACTION ON THE HUMAN BODY BOTH IN HEALTH AND IN DISEASE.

A sufficient number of cases induced me to believe that these two alkalies possess the medical properties of the cinchonas, and, consequently, that they may be substituted

on all occasions. Several physicians, amongst whom I may mention MM. Double, Villermé, and Chomel, have arrived at similar conclusions.

[In a very interesting paper by Dr. Elliotson, in a late part of the *Medico-Chirurgical Transactions*[i], the febrifuge efficacy of both simple quinine and of the sulphate is strongly exemplified. In the practice of several of his friends, also, every case of intermittent fever presently yielded to the sulphate; when in some the bark had previously failed; its febrifuge properties are likewise confirmed by Dr. Dickson of Clifton[k].]

We know how advantageous it is in the treatment of disease to be certain of the precise dose of all active remedies; this advantage especially applies to the present case, because the quantity of the alkalies contained in the cinchonas varies prodigiously, according to the nature and quality of the bark which is employed. It is often also very desirable to administer this medicine in a small volume, and in an agreeable form. Patients often die of malignant fevers, because they cannot swallow the necessary quantity of the bark in

[i] [Vol. xii. Part 2, p. 543.]

[k] [*Edinburgh Medical and Surgical Journal*, Oct. 1823.]

powder. Some throw it up after having taken it; and in others superpurgation arises, so that the powder passes through the intestinal canal without producing any effect; even in the most favourable cases it is necessary the patient's stomach should, as it were, chemically analyze the bark with which it is filled, and extract its febrifuge principle. A process like this will be always difficult and fatiguing even for the strongest stomach. Chemistry, therefore, has done a great service to medicine, by shewing how this separation may be accomplished beforehand.

MANNER OF EMPLOYING THE ALKALIES EXTRACTED FROM THE CINCHONAS.

The sulphates of quinine and cinchonine are the preparations most commonly employed. From one to ten grains (gr. 0.82 to gr. 8.2 troy) of either of them may be given in the twenty-four hours. Some physicians have thought it necessary to carry the dose much higher than this, but in general the success has not answered their expectations; several patients, indeed, have experienced somewhat severe accidents, such as great agitation with very strong cerebral excitement. In no case have I been obliged to give more than ten grains (gr. 8.204 troy) in the twenty-four

hours, and I have never found it fail in its effect.

M. Pelletier has prepared, according to my formula, a colourless and transparent syrup of cinchona, each ounce (7 dr. 52 gr. troy) of which contains two grains (gr. 1.64 troy) of quinine. I daily use this preparation with the most satisfactory results; it appears to me to exert a beneficial influence over the scrophulous affections of children.

SYRUPUS QUININÆ.

Syrup of Quinine.

Take of

Simple syrup ..... 2 pounds, (31 oz. 4 dr. 2 gr. troy.)
Sulphate of quinine ..64 grains, (gr. 52.48 troy.)

Six spoonfuls of this syrup are commonly sufficient to arrest the progress of intermittent fevers; I have seen even one of the pernicious kind yield to the same dose.

VINUM QUININÆ.

Wine of Quinine.

Take of

Good Madeira wine .... 1 litre, (oz. 32.104 troy.)
Sulphate of quinine .... 12 grains, (gr. 9.84 troy.)

This preparation may be made with Malaga wine, or even with *vin ordinaire.*

TINCTURA QUININÆ.

Tincture of Quinine.

Take of

Sulphate of quinine ..... 6 grains, (gr. 4.92 troy.)
Alcohol of 34° (.847) .. 1 ounce, (7 dr. 52.5 gr. troy.)

The sulphate is to be preferred to the pure quinine in this case, because, when the tincture is made by using alkali not saturated by an acid, a precipitate is formed on adding it to aqueous liquors.

The wine of quinine may be extemporaneously prepared by putting two ounces (1 oz. 7 dr. 45 gr. troy) of the tincture to each pint bottle (lbs. 2.54 troy) of wine.

PREPARATIONS OF CINCHONINE.

Cinchonine has also been employed as a febrifuge and tonic, particularly by Dr. Chomel; but although both these properties have been observed in it, it would seem to possess them in a minor degree than the quinine; in certain cases, indeed, the febrifuge effect has been completely wanting. It is consequently to be

desired that practitioners should institute fresh trials regarding the virtues of this substance, which is found in almost all the cinchonas united with quinine, and may be met with alone in that of Carthagena. In order to forward such researches, I have made the following formulæ : —

SYRUPUS CINCHONINÆ.

Syrup of Cinchonine.

Take of

Simple syrup ..... 1 pound, (15 oz. 6 dr. 1 gr. troy.)
Sulphate of cinchonine, 48 grains, (gr. 39.36 troy.)

This syrup may be employed in the same doses, and under the same circumstances, as the syrup of quinine.

VINUM CINCHONINÆ.

Wine of Cinchonine.

Take of

Madeira wine ..... 1 litre, (oz. 31.104 troy.)
Sulphate of cinchonine .. 18 grains, (gr. 14.76 troy.)

Like the wine of quinine, this may be made with *vin ordinaire.*

TINCTURA CINCHONINÆ.

Tincture of Cinchonine.

Take of

Sulphate of cinchonine ..	9 grains, (gr. 7.383 troy.)
Alcohol at 34° (.847) ..	1 ounce, (7 dr. 52.5 gr. troy.)

This tincture may be used for preparing extemporaneously the wine of cinchonine, by adding two ounces (1 oz. 7 dr. 45 gr. troy) of the tincture to a pint (lbs. 2.54 troy) of Madeira wine.

VERATRINA, VERATRIA.

Veratrine.

It is again to the labours of MM. Pelletier and Caventou that we are indebted for the new alkali which we are about to consider. These indefatigable chemists having remarked, that almost all the individuals of the family of veratrum, besides having the characteristics described by botanists, possess a very acrid taste, and exercise a common action over animals, thought that it would be interesting to discover if these properties did not arise from a particular substance common to all these plants. An analysis of the seeds of the *veratrum sabadilla*[a] confirmed their conjec-

[a] [This analysis furnished the following constituents :— 1. A fatty compound, composed of oil, adipocire and cevadic acid; 2. Wax; 3. Yellow extractive colouring matter; 4. *Veratrine*, forming with gallic acid an acid salt; 5. Gum; 6. Woody fibre. The ashes, which were in small quantity, were almost wholly composed of the carbonate and phosphate of lime, with some traces of the hydrosulphate and carbonate of potass, and silica. Meissner, however, gives the most elaborate analysis of

tures. They isolated this acrid principle, in which they recognised all the alkaline characters. They ultimately discovered it in the root of the colchicum (*colchicum autumnale*[b]), and in that of the white hellebore (*veratrum commune*[c]); and they called it *veratrine,* from the name of the family to which these vegetables belong.

this substance: he found it to consist of — Fixed oil 24.2; adipocire 0.43; wax 0.1; resin, soluble in ether 1.45; resin, insoluble in ether 8.43; *veratrine* 0.58; bitter extractive, with an undefined acid 5.97; sweet extractive 0.65; gum 4.82; oxygenated extractive (ultrine?) which may be extracted by potass 24.14; woody fibre 20.56; phyteumacolle with hydrochlorate of potass, and a vegetable salt with a base of potass 1.21; oxalate of lime with bassorine 1.06; water 6.4.]

[b] [The root of the colchicum, according to MM. Pelletier and Caventou, yields on analysis:—1. A fatty matter composed of oil, adipocire, and a volatile acid; 2. Yellow extractive colouring matter; 3. Acid gallate of *veratrine;* 4. Gum; 5. Fecula, with inuline and woody fibre. It yields very few ashes.]

[c] [The root of the *veratrum album* or *commune* yields, 1. A fatty matter composed of oil, adipocire, and an acid similar to the cevadic, but incrystallizable; 2. Yellow extractive colouring matter; 3. Acid gallate of *veratrine;* 4. Gum; 5. Fecula; 6. Woody fibre. The ashes contain carbonates of potass and lime, sulphate of lime and silica.—*Pelletier and Caventou.*]

PREPARATION OF VERATRINE.

They repeatedly digested the seeds of the *veratrum sabadilla* in boiling alcohol. These tinctures, filtrated whilst almost boiling, deposited, on cooling, whitish flakes of wax. They re-digested the matter which remained dissolved, after evaporating it to the consistence of an extract, in cold water: a small quantity of fatty matter now remained on the filter. The solution was slowly evaporated, and it formed an orange yellow precipitate, which possessed the characteristics of the colouring matter found in almost all the woody vegetables. On adding a solution of acetate of lead to the liquor, which was still deeply coloured, a new and very abundant yellow precipitate was immediately formed, which was separated by means of the filter. The liquor, now nearly colourless, still contained, amongst other substances, the acetate of lead, which had been added in excess: a current of hydrosulphuric acid was used to separate the lead. The liquor was then filtrated and concentrated by evaporation, treated by magnesia, and again filtrated. The magnesian precipitate was digested in boiling alcohol. The alcoholic

liquors yielded, on evaporation, a pulverulent substance, which was extremely acrid, and possessed all the properties of the alkalies. This substance was at first yellowish; but, by solutions in alcohol, and subsequent precipitations, caused by pouring water into the alcoholic solutions, it was obtained in the form of a very white and perfectly inodorous powder.

[M. Meissner, who discovered the veratrine nearly at the same time as MM. Pelletier and Caventou, recommends the seeds of the *cevadilla* to be treated with absolute alcohol, the alcoholic infusion evaporated, the residuum treated with water, the liquor filtered, and the veratrine to be precipitated by the carbonate of potass: it then only remains to wash the precipitate with water[d].]

CHEMICAL PROPERTIES OF VERATRINE.

Veratrine is scarcely at all soluble in cold water; boiling water, however, dissolves $\frac{1}{1000}$ of its weight, and becomes sensibly acrid.

It is very soluble in ether, and still more so in alcohol. It is insoluble in the alkalies, and

[d] [*Chimie Organique de Gmelin.* P. 400.]

soluble in all the vegetable acids. It saturates all the acids, and forms with them incrystallizable salts, which, on evaporation, take the appearance of gum. The sulphate alone affords rudiments of crystals when its acid is in excess.

Nitric acid combines with veratrine; but if added in excess, especially when concentrated, it does not produce superoxidation, as in the cases of morphine and strychnine; but very rapidly resolves the vegetable substance into its elements, and gives birth to a yellow detonating matter analogous to the *bitter of Welther*.

Veratrine restores the blue of turnsol paper when reddened by acids. Exposed to the action of heat, it liquefies at a temperature of 50° (122° Fah.) above zero, and has then the appearance of wax: on cooling, it forms an amber-looking mass of a translucent appearance. Distilled on the naked fire, it swells up, becomes decomposed, and produces water, much oil, &c. A voluminous, carbonaceous, mass remains, which, when incinerated, leaves only a very slightly alkaline residuum.

ACTION OF VERATRINE ON ANIMALS.

A very small quantity of acetate of veratrine[e] thrown into the nostrils of a dog, instantly provokes violent sneezing, which sometimes continues for nearly half an hour.

One or two grains (gr. 0.82 or 16.4 troy) placed in the gullet, immediately occasions copious salivation, which continues for some time.

If a small quantity be thrown into any part of the intestinal canal, and the body be opened to observe the effects, the intestine is found to become much indurated, and to relax and contract alternately for a certain time. The part of the mucous membrane which comes in contact with the veratrine is inflamed; the irritation spreads, and vomiting and purging are produced. In a much larger dose the substance induces a very great acceleration of the circulation and of respiration, which is soon followed by tetanus and death.

The effects are still more rapid if one or two grains (gr. 0.82 or 1.64 troy) be thrown into the pleura, or into the tunica vaginalis. In less

[e] Of all the preparations of veratrine, the acetate alone, as being one of the most active, has been used in the experiments instituted for determining the action of this substance on animals.—M.

than ten minutes death occurs, preceded by tetanic convulsions.

The same quantity thrown into the jugular vein also induces tetanus and death, in a few seconds. Dissection shews, even in this case, that the veratrine has produced an effect on the intestinal canal; for the mucous membrane is found to be highly injected. The lung also presents signs of inflammation and of engorgement[f].

[f] It is apparent from the above, that when a small quantity of this substance is placed in the intestinal canal, it produces only local effects, or, at least, that the effects are restricted to the canal; and that it must be given in a large dose, or be applied to parts whence absorption goes on very actively, as to the pleura and the tunica vaginalis, in order that its terrific general effects above-mentioned may be produced.—M.

It may be added to this note of the Author, that the deleterious effects of an over-dose of colchicum in the human subject do not exactly accord with the account given by him. Colchicum certainly induces inflammation of the mucous membrane of the bowels, whenever it is given in too large a dose; the Translator, from a large experience, thinks in all cases: but it never, probably, produces tetanic convulsions, nor any thing resembling them. The Translator thinks it right to give the following fatal case of gout, from an over-dose of the tincture of colchicum bulb, in elucidation of this opinion. He has also heard of other corroborative cases, where death followed a large dose of other preparations of colchicum,

ACTION OF VERATRINE ON MAN IN A STATE OF HEALTH AND DISEASE.

The effects of veratrine in a large dose have not been observed on man: they would, how-

especially one, where a female took a tea-spoonful of the seeds. The note of the case of gout, made at the time, has been kindly furnished by the attendant practitioner.

"Mrs. ——, aged forty, after frequently suffering from gout, requested her medical man to give her the colchicum in a very severe fit.

"She took ʒiiss of a tincture made by infusing ℥iv. of the root in ℥viij. of proof spirit for three days, the mixture being kept at nearly 100° of temperature. This was given in the morning of Dec. 5. In the evening it had produced no effect, except slight qualmishness. Calomel gr. iij. opii gr. i. was ordered at bed-time, and a purging draught for the morning. However, in the night, vomiting and purging commenced, and continued all the next day, in spite of effervescing volatile saline draughts with opium; so that, in the evening of the 6th, opii gr. i. camphor gr. iii. were given and repeated in two hours.

"On the 7th, from accident, she was not seen till three *p. m.*, when she was found in the collapse preceding death. The gout had previously gradually subsided. It was stated that she became faint at two o'clock *p. m.*, and not till then were her friends alarmed. By opium and spirits warmth was reinduced upon the extremities, and a feeling of greater comfort produced; but the pulse never completely recovered, although the sickness was completely subdued; so that at ten *p. m.* she fell into an apoplectic kind of sleep, which terminated in death before morning.

ever, doubtless be the same as those which are noticed in animals.

The taste of veratrine is very acrid, but without bitterness. It excites a very copious salivation, however small the quantity may be which is put into the mouth.

Though veratrine is absolutely inodorous, it is inconvenient to smell at it too closely when in a state of powder; for even the small quantity which is thus carried into the nostrils is often sufficient to produce violent sneezing, which may become dangerous.

A dose of a quarter of a grain (gr. 0.205 troy) rapidly induces very abundant alvine evacuations. If the dose be augmented, more or less violent vomiting is occasioned.

"It is peculiar, in this case, that Mrs. —— was delicate, and some years before had nearly suffered death from incessant vomiting, attended by cold extremities; it was relieved by inducing gout on the swelled knee by mustard cataplasms. In the fatal attack the sinapism was applied, with the effect of producing great pain, but without inflammation or heat of skin.

"It should be mentioned also, that this female's mother is exceedingly susceptible of the action of colchicum, in even very small doses. The attendant practitioner begged also to add, that he only prescribed so large a dose as ʒiiss., because the tincture had only been made three days, and the formula directed it should be infused a fortnight."

I have lately given it in the dose of two grains (gr. 1.64 troy) in the 24 hours, without producing too many alvine evacuations. The subject of the case was an old man, who had been struck with apoplexy some time previously. This circumstance forms an additional proof of the influence which the nervous system possesses over the mode of action of medicines.

After having cautiously tasted the mixture which contained the two grains (gr. 1.64 troy) of veratrine, I experienced, for several hours, an almost insupportably acrid sensation in the mouth and pharynx, the impression of which had not entirely disappeared on the following day. The patient felt no such inconvenience.

CASES PROPER FOR THE EXHIBITION OF VERATRINE.

As veratrine produces the same effects as the plants from which it is extracted, it may be substituted very advantageously for them; because it permits the quantity of the active substance used to be estimated, which the others do not.

Veratrine is particularly applicable in cases where it is necessary to excite quickly a strong

action of the bowels. When given with this intention, it has answered very well in the case of old people, where an enormous accumulation of fæces existed in the great intestine.

ACIDUM HYDROCYANICUM, ACIDUM PRUSSICUM.

Hydrocyanic, or Prussic Acid.

In a paper laid before the Academy of Sciences in November, 1817, I made known the successful results which followed the employment of prussic acid in the treatment of diseases of the chest. Since that period this medicine has been used by a great number of medical men, not only in Europe, but in several towns of the United States of America. Every where the success has been the same; so that this formidable substance may now be considered as one of the most interesting remedies which we possess.

Scheele discovered the prussic acid in 1780; but he only obtained it mixed with a varied proportion of water. M. Gay-Lussac first procured it in a state of purity[a].

PHYSIOLOGICAL PROPERTIES.

This acid is liquid, transparent, and colourless, at the ordinary temperature. Its taste is

[a] *Annales de Chimie*, tom. lxvii. p. 128, and tom. xcv. p. 136.

at first cooling, but soon becomes acrid and irritating. It slightly reddens the tincture of turnsol, has a very powerful, and, it may be, deleterious, odour, which is only supportable when mixed with a very large quantity of air. It is then found to be the same as the odour of bitter almonds.

CHEMICAL PROPERTIES.

Prussic acid is very volatile; in fact, it boils at 26°.5 (79.7 Fah.) under a pressure of $0^m.76$ [b], and at 10° (50 Fah.) it sustains a column of mercury of $0^m.38$; still its congelation takes place at 15° (59 Fah.). Also, when a few drops are put on paper, the portion which

[b] $0^m.76$ probably means $\frac{76}{100}$ of a metre; if so, it is equal to 29.9 English inches, and $0^m.38 = 14.95$. With regard to the $0^m.38$ as the measure of a column of mercury, it may be useful to remark, that it is not uncommon to estimate the force of the expansion of all fluids at any temperature by the column of mercury which they will sustain. This is done by introducing into a Torricellian vacuum a small portion of the fluid to be examined, and applying heat thereto. The apparatus is a curved tube, with two pretty nearly equal legs, one of them being sealed, and the other open to the atmosphere. The force of the vapour is shewn by the depression of the mercury in the sealed leg, and its elevation in the other; the difference in the height of the two columns being the measure of it.—Tr.

almost immediately evaporates, produces enough cold to crystallize the rest. It is the only liquid which possesses this property.

Prussic acid is but little soluble in water; hence, when shaken with ten or twelve times its volume of that fluid, it again collects on the surface like the oils and the ethers. Alcohol easily dissolves it.

When left to itself in close vessels, it sometimes becomes decomposed in less than an hour. It rarely preserves its integrity for more than a fortnight.

MODE OF PREPARING THE PRUSSIC ACID.

Hydro-cyanic acid is obtained by digesting the crystallized deuto-cyanuret of mercury, in two-thirds of its weight of liquid and slightly fuming hydrochloric acid, in a tubulated retort, which communicates with a receiver containing fragments of chloruret of calcium and chalk, and which itself communicates with a much smaller receiver, destined to collect the product. These receivers must be surrounded by a mixture of ice and salt. After the deuto-cyanuret of mercury, and the acid have been successively put into the retort, a slight heat is to be applied; a little ebullition soon succeeds, arising in part from the evaporation of

the prussic acid, which is formed, and is condensed in the first receiver with a little hydrochloric acid and water. When the quantity of water becomes very sensible, the operation must be suspended, in order that the product already obtained may be purified; this is performed by isolating the first receiver from the retort, taking away the ice which surrounds it, and replacing the ice by water at 32 or 33 degrees (89.6 or 91.4 Fah.) Under these circumstances the hydro-cyanic acid passes alone into the smaller receiver; for the water and the hydrochloric acid, which were at first volatilized with it, are now retained in the first receiver; the water by the chloruret of calcium, and the hydrochloric acid by the lime.

[M. Gea Pessina, a pharmacien at Milan, has recommended the following process for obtaining the hydrocyanic acid from prussian blue of a uniform strength: —

Eighteen parts of the ferruginous prussiate of potass, are to be introduced in a state of fine powder into a tubulated glass retort, to which a small globular and tubulated receiver is adapted; whence a tube issues, which is dipped into a flask containing a small quantity of distilled water. A refrigerated mixture, of nine parts of concentrated sulphuric acid and twelve of water, is then poured into

the retort: the tubulure closed, and the whole left at rest for twelve hours: the globular receiver being surrounded with ice, and the neck of the retort constantly cooled with wet cloths: the materials are afterwards heated, and the heat kept up until the striæ which are observed in the neck of the retort during the operation become more rare, and until a blue matter is ready to pass into the receiver. The fire is then to be removed: the whole allowed to cool, and the contents poured into a proper vessel. According to M. Pessina, the hydrocyanic acid thus obtained has a strong and penetrating odour. Its s. G. is from 0.898 to 0.900 at the temperature of 13° or 14° Reaumur, (62° or 64° Fah.), and it possesses every property of the pure prussic acid.[c].]

ACTION ON ANIMALS.

One drop of pure prussic acid placed in the throat of the most vigorous dog makes it fall stone dead, after two or three deep and hurried inspirations.

The effects of placing a small quantity of the acid in the eye are similar and almost as sudden.

[c] [*Giorn. di Fisica*, August, 1822; and *Journal de Pharmacie*, 1823, p. 16.]

A drop of acid mixed with a few drops of alcohol, when injected into the jugular vein, kills the animal instantly, as if he had been struck by lightning.

Scarcely any traces of irritability can be found, a few moments after death, in the muscles of animals thus poisoned by prussic acid.

ACTION ON MAN IN A STATE OF HEALTH AND IN DISEASE.

Pure prussic acid produces the same effects on man as on animals. Even the vapour of it must be cautiously avoided; for, if breathed, it produces considerable pain in the chest, and a feeling of oppression, which often remains for several hours.

[We are told by Professor Orfila, that a professor of Vienna having prepared a pure and concentrated prussic acid, spread a certain quantity of it on his naked arm, and died a short time afterwards.]

When properly diluted, however, it has the effect of calming the increased irritability which resides in certain organs when in a state of disease.

Even when given in proper doses, if the intervals be too short, it will produce headache; and a species of vertigo, which goes off in a few minutes.

CASES IN WHICH IT MAY BE PRESCRIBED.

Properly diluted prussic acid may be given with success in all cases of augmented irritability of the pulmonary organs. Hence it is proper in the treatment of nervous and chronic coughs, of asthma, of hooping-cough, and in the palliative treatment of consumptions. Nay, numerous observations would seem to shew that it will cure this latter disease when not beyond its first degree. In England it has been used with success for that hectic cough which is sympathetic of an affection of another organ, and in dyspepsia. In Italy it has been found to calm the too great irritability of the uterus, even in cases of cancer, and to moderate the activity of the heart in almost all sthenic diseases.

MODE OF PRESCRIBING IT.

The medical properties of prussic acid, prepared according to Scheele's method, are not sufficiently determinate, on account of the arbitrary nature of the process. It is better, then, to use M. Gay-Lussac's acid, when properly diluted by adding six times its volume, or 8.5 times its weight, of distilled water. A mixture is formed, which I call *medicinal prussic acid.*

I commonly use the following forms: —

MISTURA ACIDI HYDROCYANICI.

Mixture of Prussic Acid.

(*Mélange pectoral.* MAGENDIE.)

Take of

Medicinal prussic acid, 1 gros (gr. 59.07 troy.)
Distilled water .... 1 pound (15 oz. 6 dr. 1 gr. troy.)
Pure sugar ..... 1½ ounce (11 dr. 10 gr. troy.)

Take a dessert-spoonful every morning and evening at bed-time. The dose may be gradually increased to six or eight spoonfuls in the twenty-four hours.

It is necessary to shake the mixture every time it is used, lest great inconvenience arise from the acid being accumulated on the surface.

POTIO ACIDI HYDROCYANICI.

Potion of Hydrocyanic Acid.

(*Potion Pectorale.* MAGENDIE.)

Take of

Infusion of ground ivy ....2 ounces (1 oz. 7 dr. 45 gr. troy.)
Medicinal prussic acid ..15 drops.
Syrup of marshmallows, 1 ounce (dr. 7.52 troy.)

A dessert-spoonful to be taken every nine hours, always shaking the bottle.

SYRUPUS ACIDI HYDROCYANICI.

Hydrocyanic Syrup.

Take of

Clarified syrup ····· 1 pound (15 oz. 6 dr. 1 gr. troy.)
Medicinal prussic acid·· 1 gros (gr. 59.07 troy.)

This syrup may be added to common pectoral mixtures, and be used as other syrups are [e].

[e] In this country Scheele's method of preparing prussic acid is used almost exclusively, and forms the preparation which is obtained from Apothecaries' Hall and other places. We shall, therefore, give this process below. The dose of this preparation is from ♏ij. to ♏viij. given in distilled water, or in almond emulsion. The Translator's doses, however, are regulated by a different rule. He thinks that the advantageous effects of prussic acid, as well as of other powerful remedies, as digitalis, can only be obtained by increasing the dose to the required amount, let that be what it may. But he dare not, with such views, entrust the rate of increase to the patient's discretion: he, therefore, gives nearly every dose himself, regulating the increase and the interval by the effect produced. He makes these observations here, because he is sure that powerful and valuable remedies like these have fallen into disuse, on account of the insufficient or evil effects which have followed a less methodical or cautious exhibition of them.

Scheele's Process, as given by Mr. Thomson, p. 23.—" Mix two ounces of prussian blue with six ounces of

[LOTIO ACIDI HYDROCYANICI.

Hydrocyanic Lotion.

Take of

Hydrocyanic acid	f. ℥iv.
Rectified spirit of wine ..	f. ℥j.
Distilled water	f. ℥xss.

This lotion has been used with the utmost benefit by Mr. A. T. Thomson in impetigo : it

red precipitate of mercury, and add six ounces of water : boil the mixture for some minutes, constantly agitating it, when the blue colour will disappear, and the mass assume a yellowish grey hue. Pour the whole on a filter, and wash the residuum with a little hot water, which is to be added to the filtered liquor. Pour this upon an ounce and a half of clean iron filings, and add three drachms of strong sulphuric acid. Shake this mixture well, and after the powder subsides, pour the fluid into a retort, and distil one-fourth part of it over into a well-luted receiver. This is the hydro-cyanic acid, containing an admixture of a little sulphuric acid, which is readily separated by means of barytic water. La Planche recommends $\frac{1}{6}$ only to be distilled over, and this to be rectified by means of a gentle fire over $\frac{1}{200}$ of carbonate of lime, drawing off afterwards, by means of a gentle fire, $\frac{3}{4}$ only of the whole, thus treated by a second distillation. The acid is obtained of a uniform strength by this method."

Other practitioners again prefer *laurel water*, made

completely allayed the distressing and intolerable itching and tingling with which the subjects of this severe affection are tormented, in two cases, where other external applications and the internal use of anodynes had been of no avail; the discharge was diminished by it and rendered milder: alterative doses of mercury, combined with sarsaparilla, formed the internal treatment[f]. Mr. Thomson has also found this ointment useful, in combination with small doses of oxymuriate of mercury, in *acne rosacea*, and several other cutaneous diseases.]

REMARKS ON PRUSSIC ACID.

It is not without reason that we have objected to the employment of *Scheele's prussic acid:* in fact, this acid is never constant in the proportion of the real acid and the water which it contains, if Scheele's process be followed

by distilling two drachms of fresh leaves chopped with four ounces of water, recommitting the distilled water twice afterwards on the same quantity of fresh leaves, and, making, ultimately, four ounces of the menstruum; of which, from ♏xxx. to f. ℥j. every six hours, may be given until a sedative effect is produced.—Paris's *Pharmacologia*, vol. ii. p. 23.

[f] [*London Medical and Physical Journal*, February, 1822.]

in the making of it: this is owing to the difficulty which exists in uniting the same circumstances in each operation. If, in order to avoid this inconvenience, we wish to prepare the acid called *Scheele's*, with the pure acid of M. Gay-Lussac, by diluting the latter acid with water, what quantity must we add to it? M. Robiquet (*Journal de Pharmacie*, 1818) proposes to employ two parts of water to one of the pure acid. The acid of Scheele, thus prepared, is twice as strong as the acid which I have recommended, and is consequently attended with greater inconveniences in its employment. These inconveniences are made still greater by the incorrect manner in which M. Robiquet's process is detailed in the *Codex de Paris*. In this formulary it is recommended, quoting at the same time M. Robiquet's *Mémoire*, to dilute the prussic acid with an equal quantity of water. After describing this process, the same work gives the form for a syrup in which the prussic acid, thus prepared, enters in the proportion of one part to nine of simple syrup. The syrup, so prepared, can only be administered by drops[g]. Should, unfortunately, an ounce (7 dr. gr. 52.56 troy) be mixed in a potion, it would produce death.

Notwithstanding what we have just said

[g] Several serious accidents have followed the employment of this syrup of the new Codex.—M.

regarding the strength of the *prussic acid of Scheele*, prepared according to the *Codex*, and the process of M. Robiquet, the majority of physicians represent it as much weaker than my *medicinal prussic acid*, and sometimes order it in the proportion of more than *a gros* (gr. 59.97 troy) in a potion of four ounces (3. oz. 7 dr. 30 gr. troy) to be taken by spoonfuls. The *pharmaciens* of Paris are in general so much accustomed to see the *prussic acid of Scheele* enter in a large dose into medical prescriptions, that, in order to avoid accidents, they prepare this acid by diluting the prussic acid of Gay-Lussac with *forty parts* of water. This perfectly arbitrary quantity of water, permits them, at least, to fulfil, without danger, the orders which they receive, when, from the high dose of the acid, they observe that it is not my *medicinal acid* which the physician could have meant in his prescription.

SOLANINA. SOLANA.

Solanine.

This alkali has been very lately discovered by M. Desfosses, apothecary at Besançon, in two species of the family of *solanum*, namely, in the nightshade *(solanum nigrum)*, and the bitter-sweet *(solanum dulcamara)*. It exists in both these plants; but whilst it is evidently contained in the leaves of the latter, those of the nightshade afford no traces of it.

PREPARATION OF SOLANINE.

It is found most abundantly in the berries of the nightshade, where it exists in the state of a malate. In order to obtain it, digest the filtrated juice of these berries in ammonia; a greyish precipitate is formed, which, when washed on a filter and digested in boiling alcohol, gives, by evaporation, the salifiable base in a state of sufficient purity, if perfectly ripe berries have been operated on; but if the berries have been green, the solanine is mixed with a certain quantity of *chlorophylle*[a],

[a] [This term is applied to the colouring principle of the green parts of plants, especially of the leaves.]

which cannot be separated without much difficulty.

PROPERTIES OF SOLANINE.

Perfectly pure solanine is in the form of a white, opaque, and sometimes pearly, powder.

It is inodorous; its taste is slightly bitter and nauseous; and its bitterness is developed by solution in acids, especially in acetic acid. Its salts are incrystallizable, the solutions giving by evaporation a gummy transparent mass, which may be easily powdered.

Solanine is insoluble in cold water, and hot water only dissolves $\frac{1}{5000}$th part. Alcohol dissolves a small quantity.

Its alkaline properties are slightly manifested by its action on turmeric. It, however, restores the blue of turnsol paper when reddened by acids. It unites with acids even in the cold, and perfectly neutral solutions may be obtained if care be used. Like all other vegetable alkalies, it is saturated by a very small quantity of acid.

ACTION ON ANIMALS.

From two to four grains (gr. 1.64 to gr. 3.28 troy) introduced into the stomach of a dog or cat, excites violent vomiting, which is soon followed by a sleep of several hours. Even

eight grains (gr. 6.56 troy) were insufficient to kill a young cat. After vomiting violently, the animal slept soundly for more than thirty-six hours.

ACTION ON MAN.

A very small quantity of solanine produces great irritation in the throat. It has a slightly bitter, nauseous flavour in the mouth; which is much more intense, however, if the substance be dissolved in a little acetic acid. The acetate is the only salt which has been tried on man: a quarter of a grain (gr. .205 troy) produces nausea, but no disposition to sleep.

It appears then that solanine, like opium, produces vomiting and sleep; but whilst its emetic properties seem to be more apparent than those of opium, its narcotic ones are evidently much less powerful.

CASES IN WHICH SOLANINE MAY BE USED.

It has not yet been tried in cases of disease, but it may be used wherever the extract of nightshade, or that of dulcamara, is indicated.

[ATROPINA. ATROPIA.

Atropine.

THIS substance was discovered by Brandes, in the *atropa belladonna*[a], and it is in this salifiable base he considers that all the medical and deleterious properties of the belladonna reside.

PREPARATION OF ATROPINE.

In order to obtain this principle, M. Brandes boiled two pounds of the dried leaves of the *atropa belladonna* in a sufficient quantity of

[a] [The *atropa belladonna* yields on analysis the following constituents: — Wax 0.7; resinous chlorophylle 5.84; acid malate of *atropine* 1.51; gum 8.03; fecula 1.25; woody fibre 13.7; phyteumacolle 6.9; a matter analogous to osmazóme, with malate of *atropine*, oxalate, hydrochlorate, and sulphate of potass 16.05; soluble albumen 4.7; hard albumen 6; ammoniacal salts and acetates, malate of *atropine*, oxalate, malate, sulphate, hydrochlorate, and nitrate of potass; oxalate, malate (?) and phosphate of lime, and malate and phosphate of magnesia 7.47; water 25.8; loss 2.05. The ashes contain oxide of copper.—*Brandes and Vauquelin.*]

water, pressed out the decoction, and boiled the leaves again in water. The decoctions were mixed, and some sulphuric acid was added in order to throw down the albumen and similar bodies: the solution was thus rendered thinner, and passed more readily through the filter. The decoction was next supersaturated with potass; by which he obtained a precipitate, weighing, after having been washed with pure water and dried, 89 grains. It consisted of small crystals, from which, by solution in acids, and precipitation by alkalies, atropine was obtained in a state of purity[b].

Or, atropine may be obtained by digesting the decoction of the herb of the *atropa belladonna* with magnesia; boiling the precipitate in alcohol and filtering: the atropine crystallizes, on cooling, in needles or colourless translucent and shining prisms[c].

PROPERTIES OF ATROPINE.

Atropine, according to M. Brandes, is white, almost insoluble in water, and much more soluble in hot than in cold alcohol, and in-

[b] [Ure's *Chemical Dictionary*, art. *Atropia.*]

[c] [*Chimie Organique*, par Leopold Gmelin: edition de Virey. p. 398.]

soluble in ether and the oils. It forms with acids neutral crystallizable salts.

ACTION OF ATROPINE ON THE ANIMAL ECONOMY.

When M. Brandes was experimenting on this alkali, he was obliged to desist, in consequence of the violent headaches, pains in the back, and giddiness, with frequent nausea, which the vapour of atropine occasioned: it had, indeed, so injurious an effect upon his health, that he has entirely abstained from any further experiments, and no one has hitherto repeated them. He once tasted a small quantity of the sulphate of atropine; the taste was not bitter, but merely saline: there soon followed, however, violent headache, shaking in the limbs, alternate sensations of heat and cold, oppression of the chest, difficulty in breathing, and diminished circulation of the blood. The violence of these symptoms ceased in half an hour. Even the vapour of the various salts of atropine produces vertigo. When exposed for a long time to the vapours from a solution of nitrate, phosphate, or sulphate of atropine, the pupil of the eye becomes dilated. This occurred frequently to M. Brandes; and when he tasted the salt of atropine, the dilatation

followed to so great a degree, that it persisted for twelve hours, and was not influenced by the different shades of light[d].

M. Brandes has also succeeded in extracting from the seeds of the *Datura stramonium*[e], and from the *Hyoscyamus niger*[f], two alkaline

[d] [*Schweigger's Journal*, 28. 1; *Repert. de Buchner*, ix. 71; and *Ure's Dictionary of Chemistry*, 1823.]

[e] [The seeds yielded the following constituents to that gentleman: — Fixed oil 13.85; thick fatty oil 0.8; fatty butyraceous body, with resinous chlorophylle 1.4; wax 1.4; resin insoluble in ether 9.9; yellowish red extractive matter 0.6; malate of *daturine* 1; incrystallizable sugar, with a salt with a base of *daturine* 0.8; gummy extractive matter 6; gum, with different salts 7.9; bassorine, with alumina and phosphate of lime 3.4; woody fibre 22; phyteumacolle 4.55; albumen 1.9; a matter analogous to ulmine, called by M. Brandes *glutenoine* 5.5; malate of *daturine*, malate and acetate of potass, and malate of lime 0.6; a membraneous secretion, containing silica 1.35; water 15.1; loss 1.95.]

[f] [The seeds of the *hyoscyamus niger* furnished to M. Brandes: — Fixed oil, readily soluble in spirit of wine 19.6; fixed oil, difficultly soluble in spirit of wine 4.6; fatty substance analogous to cetine 1.4; malate of *hyoscyamine*, with malates of lime and magnesia, and an ammoniacal salt 6.3; incrystallizable sugar, a trace; gum 1.2; bassorine 2.4; fecula 1.5; woody fibre 26; phyteumacolle 3.4; soluble albumen 0.8; hard albumen 3.7; malate sulphate (?) and phosphate of potass 0.4; malate of lime 0.4; malate of magnesia 0.2; phosphates of lime and magnesia 2.4; water 24.1; excess 1 4. The ashes contained — carbonate, phosphate, sulphate (?) and

principles of a similar nature to the above, to which he has given the names of DATURINE and HYOSCYAMINE; he has, however, favoured us with but a very imperfect account of these principles. The experiments merit a repetition; but the examination of these bases, as they contain the whole of the poisonous matter of the plants whence they are extracted, requires very considerable circumspection. Even the vapour, as has been shewn in the case of atropine, is exceedingly prejudicial.]

hydrochlorate of potass; carbonate and much phosphate of lime; much silica, manganese and iron, and a very little copper.]

DELPHININA, vel DELPHINA. DELPHIA.

Delphinine, or *Delphine*.

This alkali was discovered, in 1819, by MM. Feneulle and Lassaigne, in the seeds of the stavesacre (*delphinium staphisagria*[a]); the name of *delphine* being taken from delphinium, because it is probable that the acrid nature of the

[a] [These gentlemen found in the seeds the following constituents: — 1. Volatile oil, a trace; 2. A yellowish fixed oil; 3. A brown bitter principle, not precipitable by the acetate of lead; 4. A yellow bitter principle, not precipitable by the acetate of lead; 5. Malate of *delphine*; 6. Incrystallizable sugar; 7. Gum; 8. Woody fibre; 9. Animal matter, insoluble in spirit of wine, precipitable by acetate of lead and infusion of galls; 10. Albumen; 11. Salts, with a base of potass and lime.

M. Brandes has also given us the following analysis: — Fixed oil, very soluble in spirit of wine 14.4; fixed oil, sparingly soluble in spirit of wine 4.7; fatty matter, analogous to cetine 1.4; *delphine* 8.1; gum, with traces of phosphate of lime, and of a vegetable salt, with a base of lime 3.15; fecula 2.4; woody fibre 17.2; phyteumacolle, with malate, acetate, sulphate, and hydrochlorate of potass, and a salt with a base of lime 30 67; vegetable albumen 0.5; concrete albumen 3.2; sulphate of lime, with phosphate of magnesia 3.62; water 10; excess 1.49.]

plants of this family is owing to the above principle. The other species of delphinium, however, have not yet been examined.

PREPARATION OF DELPHININE.

Boil a portion of the seeds of delphinium, cleared of their coverings, and reduced to a fine paste, in a little distilled water; pass the decoction through a linen cloth, and filtrate it. Add very pure magnesia, and boil for some minutes. Filtrate again; wash the residue carefully, and digest in highly rectified alcohol. On evaporating the alcoholic tincture, delphinine is obtained in the form of a white powder, which affords some points of crystallization.

This is the most simple mode of obtaining delphinine. If a large quantity be required, the following is a preferable method, on account of the time and patience necessary to decorticate the seeds.

Submit the uncleaned grain, when well bruised, to the action of weak sulphuric acid. Precipitate the liquor by ammonia, and redissolve in alcohol the delphinine which is still slightly coloured. To purify it, draw off the alcohol by distillation; dissolve the residuum in hydrochloric acid, and boil it with mag-

nesia. Alcohol will now dissolve the deposit in a state of perfect purity.

PROPERTIES OF DELPHININE.

Pure delphinine is in the form of a white powder, which is crystalline when moist, but soon becomes opaque on exposure to the air. It is inodorous, and has a very bitter and afterwards acrid taste.

Water dissolves so small a quantity of it, that it can only be discovered by the slight bitterness it communicates.

Alcohol and ether dissolve it very readily. The alcoholic solution acts powerfully in turning the syrup of violets green, and restores the blue of turnsol paper when reddened by acids.

Delphinine forms with the sulphuric, nitric, hydrochloric, oxalic, acetic, and other acids, very soluble neutral salts, the taste of which is extremely acrid and bitter. Alkalies precipitate it in the form of a white jelly.

[ACTION OF DELPHININE ON ANIMALS.

From the recent experiments of Orfila with this substance, it appears to prove fatal to dogs in the small dose of six grains (gr. 4.92 troy):

this effect is more speedily induced when the delphinine is dissolved in weak acetic acid; the animal in this case dies in the space of from forty to fifty minutes.

It seems to exert its action more especially on the nervous system. It likewise produces local irritation, giving rise to inflammation, when death has not immediately followed: inflammation, however, is not the necessary result of its noxious action on the stomach[b].]

CASES IN WHICH DELPHININE MAY BE PRESCRIBED.

Delphinine has not yet been used as a medicine; but if the stavesacre have any medical virtue, we may presume that it resides in the alkali above described. Delphinine should, therefore, be given where the stavesacre is indicated: when the salts of this base should be employed on account of their solubility.

[b] [*Nouveau Journal de Médecine.* Vol. x. No. 38.]

[PICROTOXINA, PICROTOXIA, PICROTOXA.

Picrotoxine.

This substance, which was discovered by Boullay, is the bitter and poisonous principle of the *cocculus indicus*, the fruit of the *menispermum cocculus*[3].

PREPARATION OF PICROTOXINE.

In order to obtain the picrotoxine the berries are boiled in water, and the solution evaporated to the consistence of an extract; it is then digested in the heat with $\frac{1}{20}$th of its weight of barytes, or pure magnesia: this compound is exhausted with hot absolute alcohol, the alcoholic solution evaporated to dryness; the residuum redissolved in alcohol, and

[3] [The fruit of the *menispermum cocculus* yields, on analysis — 1. Fixed oil; 2. Adipocire; 3. Yellow extractive colouring matter; 4. *Picrotoxine*; 5. Woody fibre: 6. Albumen; 7. Menispermic acid. The ashes contain sulphate and hydrochlorate of potass, phosphate of lime, silica, and iron.]—*Boullay.*

the solution digested with animal charcoal to deprive it of colour; it is next filtered and slowly evaporated, and the picrotoxine is obtained, on cooling, crystallized in quadrilateral, white, and transparent, prisms.

Or, to the filtered decoction of these berries add acetate of lead whilst any precipitate falls. Filter and evaporate the liquid cautiously to the consistence of an extract. Dissolve in alcohol of 0.817, and evaporate the solution to dryness. By repeating the solutions and evaporations, a substance is finally obtained equally soluble in water and alcohol. The colouring matter may be removed by agitating it with a little water. Crystals of pure picrotoxine now fall, which may be washed with a little alcohol[b].

PROPERTIES OF PICROTOXINE.

Picrotoxine is inodorous, and of a very bitter taste; it restores to blue, turnsol reddened by an acid; it is sparingly, if at all, soluble in water, but very soluble in ether and alcohol. It combines with the greater part of the acids, forming salts, the taste of which is very bitter, and which are sparingly soluble in water.

[b] [Ure's *Dictionary of Chemistry*, Art. *Picrotoxia*, and Boullay, *Annal. de Chimie*, 80, 209.]

ACTION OF PICROTOXINE ON THE ANIMAL ECONOMY.

Ten grains (gr. 8.20 troy) of picrotoxine, incorporated with crumb of bread, were given to a young middle-sized dog. At the end of twenty-five minutes, convulsions occurred, and, subsequently, staggering, which continued for the space of a quarter of an hour. The animal fell upon his side, experienced violent convulsive motions, and death took place at the end of forty-five minutes. On dissection, the stomach, filled with aliment, exhibited very marked signs of inflammation, for about an inch in extent, around the cardiac orifice; the mucous membrane was red, but without any softening. A similar dose of the crystallized acetate of picrotoxine, well dried, exhibited in the same manner to a dog of nearly equal strength, occasioned some indisposition and tremor; but at the expiration of three hours the animal did not appear to suffer any inconvenience[c].

M. Orfila affirms that picrotoxine acts upon the animal economy like camphor, but much more actively.

[c] [*Journal de Pharmacie.* Janvier, 1819.]

CASES IN WHICH IT MIGHT BE EMPLOYED.

Pitrotoxine has not as yet been used medicinally; but wherever the *cocculus indicus* is indicated, it may be advantageously exhibited: the berries are not, however, used in medicine for internal administration.]

GENTIANINA. GENTIA.

Gentianine, Gentianin.

The discovery of this alkali was attended by a circumstance so curious as to deserve to be related.

M. Henry, *Chef de la Pharmacie Centrale*, and M. Caventou[a], were both occupied in analyzing gentian at the same time, without being aware of the coincidence. Their results were so identical that it almost seemed as if they had acted in concert; they, therefore, agreed to publish them conjointly[b].

[a] [According to these gentlemen the *gentiana lutea* contains — 1. A very fugacious odorous principle; 2. A yellow crystalline bitter principle, [*gentianine*]; 3. A matter identical with bird-lime; 4. A fixed oil; 5. A greenish substance; 6. A free organic acid; 7. Incrystallizable sugar; 8. Gum; 9. A yellow colouring matter; 10. Woody fibre. Schrader discovered a resinous and narcotic principle in it; M. Planche likewise asserts, that he found the latter.]

[b] This fact is doubly remarkable: first, because it proves how perfect the means of analyzing vegetables have lately become; and, secondly, because it shews the change which the progress of science has made in those

PREPARATION OF GENTIANINE.

Digest powdered gentian in cold ether. A greenish yellow tincture is obtained at the end of forty-eight hours. If this tincture be filtrated, and the liquor sufficiently concentrated by exposure to heat in an open vessel, it forms, on cooling, a yellow crystalline mass, which possesses strongly the taste and odour of gentian.

Digest this mass in alcohol until it ceases to give a lemon colour. Add the washings together, and expose them to a slight heat; the yellow crystalline mass re-appears, which, towards the end of the evaporation, becomes solid. This mass is very bitter. Re-digest in weak alcohol, and all will be re-dissolved, except a certain quantity of oily matter.

This last alcoholic solution, besides the bitter principle of the gentian, contains its odorous matter, and also an acid substance.

By evaporating this liquor to dryness, dissolving the matter in water, adding a little well-washed calcined magnesia to it, and by

who follow scientific pursuits. One hundred years ago, such a coincidence would have produced a violent quarrel, whilst now it only induces a feeling of joy in those who find their discoveries confirmed by others.—M.

boiling and evaporation in a water bath, the greatest part of the odorous matter of the gentian may be driven off. The bitter acid is also taken up by the magnesia, and the yellow bitter principle remains partly free, and partly combined with the magnesia, to which it gives a fine yellow colour. The greater part of the bitter principle may then be obtained pure and isolated by boiling the magnesia in ether, and evaporating the solution. If it be desirable to separate still more of the bitter principle which the ether has failed to take from the magnesia, it may be done by digestion in enough oxalic acid to make the liquor acidulous. The acid unites with the magnesia, and the bitter principle, which is left free, may be obtained by the means indicated above.

PROPERTIES OF GENTIANINE.

Gentianine is yellow, inodorous, and possesses very strongly the aromatic bitterness of gentian; more decidedly so, however, when it is dissolved in an acid.

It is very soluble in ether and in alcohol, and may be separated from them by spontaneous evaporation in the form of very small, yellow, needle-like, crystals. It is much less soluble in cold water, which it renders, how-

ever, very bitter. Boiling water has more action on it.

Its colour is much deepened by the diluted alkalies, which dissolve rather more of it than water does.

Acids weaken its yellow colour very notably. Its solutions in the sulphuric and phosphoric acids are even almost colourless. Those, with the other weaker acids, however, such as the acetic, are yellowish. Concentrated sulphuric acid carbonizes it, and destroys its bitterness.

Gentianine, exposed in a glass tube to the heat of boiling mercury, is partly decomposed and partly sublimed in the form of small yellow crystalline needles.

Gentianine does not sensibly change the colour of turnsol, either when blue or when reddened by acids. It appears to be neutral.

ACTION OF GENTIANINE ON ANIMALS AND ON MAN.

It would seem, from some trials which I have made, that gentianine has no poisonous quality. Several grains thrown into the veins produced no apparent effect. I have myself swallowed two grains (gr. 1.64 troy) dissolved in alcohol: the only inconvenience which I experienced

was an extreme bitterness, and a slight sensation of heat in the stomach.

MODE OF PRESCRIBING GENTIANINE.

Apparently the tincture ought to be used the most frequently. It may be prepared after the following formula:—

TINCTURA GENTIANINÆ.

Tincture of Gentianine.

Take of

Alcohol at 24° (.903)	1 ounce (7 dr. gr. 52.5 troy.)
Gentianine	5 grains (gr. 4.1 troy.)

This tincture may be used for the elixir of gentian, and in similar circumstances.

SYRUPUS GENTIANINÆ.

Syrup of Gentianine.

Take of

Syrup of sugar	1 pound (15 oz. 6 dr. 1 gr. troy.)
Gentianine	16 grains (gr. 13.12 troy.)

This syrup is one of the best bitters that can be prescribed in scrofulous affections.

LUPULINA.

Lupuline.

The existence of this substance in the hop[a] has lately been remarked by M. Ives of New York. It had been described in France

[a] [MM. Payen and Chevallier found the cones of the French hop to consist of the following substances:—1. Water; 2. An essential oil; 3. Superacetate of ammonia; 4. Carbonic acid; 5. A white vegetable matter, soluble in boiling water, (which when precipitated on cooling does not redissolve in that fluid); 6. Malate of lime; 7. Albumen; 8. Gum; 9. Malic acid; 10. Resin; 11. A peculiar green matter, the bitter principle of the hop; 12. A fatty matter; 13. Chlorophylle; 14. Acetates of lime and ammonia; 15. Nitrate, muriate, and sulphate of potass; 16. Subcarbonate of potass; 17. Carbonate and phosphate of lime; 18. traces of phosphate of magnesia; 19. Sulphur; 20. Oxide of iron; and, 21. Silica. The Belgic and English hop, subjected to similar trials, yielded the same principles, but in different proportions. The French contained more essential oil than the Belgic, and less than the English. Hops, soon after picking, yield, *cæteris paribus*, more essential oil, and less resin than the old; a circumstance which induced MM. Payen and Chevallier to think that the oil is capable of being resinified.—*Journal de Pharmacie*, Juin, 1822.]

by M. Planche, and more recently by MM. Chevallier and Payen, under the name of *matière jaune du houblon.*

It presents itself under the form of small, shining, yellowish, grains, which cover the base of the scales of the hop.

It is of a golden colour, pulverulent, and of an aromatic odour.

When submitted to analysis, it is found to be chiefly composed of resin, volatile oil in small quantity, and a bitter principle. It is to this latter principle that the name of *lupuline* ought, it would seem, to be reserved. It has a very bitter taste, and is soluble in water, alcohol, and ether, to which it communicates its bitterness.

ACTION ON MAN AND ON ANIMALS.

M. Ives esteems it at once aromatic, tonic, and narcotic. On this subject I can say nothing with certainty. I have tried, at different times, both the lupuline in substance, and its different preparations, on animals; but I have never observed that it is a narcotic, although this property is one which is the most strikingly displayed in experiments on animals.

Mode of employing Lupuline.

PULVIS LUPULINÆ.

Powder of Lupuline.

Take of

Lupuline	1 part.
White sugar, powdered	2 parts.

First powder the lupuline in a porcelain mortar, and afterwards add by degrees the sugar: mix them accurately.

PILULÆ LUPULINÆ.

Pills of Lupuline.

Bruise it strongly, and divide into pills.

This substance becomes converted into a ductile mass, which renders it unnecessary to add any excipient.

TINCTURA LUPULINÆ.

Tincture of Lupuline.

Take of

Bruised Lupuline	1 ounce (7 dr. 52.56 gr. troy.)
Alcohol at 36° (.837)	2 ounces (1 oz. 7 dr. 45 gr. troy.)

Digest for six days in a close vessel; strain, press strongly, filter, and add a quantity of alcohol at 36° (.837), so as to make three ounces (2 oz. 7 dr. 37.6 gr. troy) of tincture.

[Mr. Nicholas Mill affirms, that from forty to sixty minims of the saturated tincture of lupuline act as an anodyne, and have a powerful effect in allaying great nervous irritation; whilst that stupidity which often accompanies the use of opium is never induced by this medicine[b].]

EXTRACTUM LUPULINÆ.

Extract of Lupuline.

This extract may be prepared, either with the aqueous infusion when it is bitter and aromatic, or with the decoction when it is equally bitter, but less aromatic, and retains some resin.

SYRUPUS LUPULINÆ.

Syrup of Lupuline.

Take of

Alcoholic tincture of lupuline	1 part.
Simple syrup	7 parts.

The doses of these preparations are not yet precisely established; but, as the lupuline contains no poisonous property, practitioners may easily determine them.

[b] [*Annals of Philosophy*, January, 1824.]

BRUCINA. BRUCIA.

Brucine.

This organic salifiable base was discovered, in 1819, by MM. Pelletier and Caventou, in the bark of the false angustura (*brucea antidysenterica*[a]). M. Pelletier has since found it joined with strychnine in the nux vomica.

MODE OF PREPARING BRUCINE.

Brucine is extracted from the bark of the false angustura by a process similar to that pointed out for the extraction of strychnine, with this difference, that in this case the *magnesian precipitate* should be much less washed, because the solubility of brucine in water is greater than that of strychnine. The brucine is afterwards obtained by evaporating the alcoholic liquors which have been used for treating the magnesian precipitate. It is, however, in a resinous form, on account of its not being yet sufficiently pure to crystallize.

[a] [According to these gentlemen the bark contains: — 1. A fatty substance; 2. A yellow colouring matter; 3. Gallate of *brucine;* 4. Traces of sugar; 5. Gum; and, 6. Woody fibre.]

In order to purify it, it must be combined with oxalic acid, and the oxalate treated by a mixture of alcohol at 40° (.817), and of ether at 60° (.742.) The colouring matter will thus be dissolved, and the oxalate of brucine remain under the form of a white powder. Decompose this oxalate by magnesia, and add alcohol to take up the brucine. By suffering the alcoholic solution to evaporate in the open air, the brucine may be obtained crystallized: if it be evaporated by the aid of heat, the brucine will be obtained fused, but not less pure.

PROPERTIES OF BRUCINE.

Brucine has a very intensely bitter taste; it is but slightly soluble in water, although more so than strychnine. When it is procured regularly crystallized, it presents itself under the form of oblique prisms, with parallelogramical bases. It dissolves at a temperature nearly equal to that of boiling water, and on cooling concretes like wax. It unites with acids, forming with them neutral salts, the majority of which are capable of being regularly crystallized. When placed in contact with concentrated nitric acid, it acquires a most intensely crimson colour, which, when the substance is warmed, changes to yellow. If in this state a solution of the proto-hydrochlorate of tin be poured upon it,

a most beautiful violet-coloured precipitate is formed; this property appertains solely to brucine [b].

ACTION OF BRUCINE ON THE ANIMAL ECONOMY.

The action of brucine on the animal economy is similar to that produced by strychnine, but it is less energetic. Its intensity has appeared to us in some experiments to be to that of pure strychnine [c] as 1 to 12. It required four grains (gr. 3.281 troy) of brucine to kill a rabbit. A tolerably strong dog, after having taken four grains experienced some strong attacks of tetanus, but recovered. Brucine might then be substituted for strychnine, and

[b] Strychnine, extracted from the nux vomica, when treated by the same means, sometimes assumes a violet tint. Under such circumstances we may feel assured that it retains brucine; for the strychnine from St. Ignatius's bean, and even that from the nux vomica, when perfectly purified, does not produce the *violet colour* with the proto-hydrochlorate of tin.—M.

[c] Dr. Andral, jun. has lately made some fresh comparative experiments on brucine and strychnine; and he has arrived at this result, that six grains of brucine are required to produce the effects of one grain of impure, and of a quarter of a grain of pure, strychnine.

The difference of action would therefore appear to be greater than what we had at first estimated. M.—[Vide *Strychnine.*]

it would have the advantage of producing similar effects without being attended by the inconvenience of being so very powerful.

MODE OF ADMINISTRATION.

Brucine, like strychnine, may be administered in pills or in tincture, gradually increasing the dose. For medical use the brucine extracted from the bark of the false angustura should be adopted; that which is obtained from the nux vomica is too apt to remain mixed with a certain quantity of strychnine, which increases its activity and prevents us from calculating its effects.

CASES IN WHICH IT MIGHT BE EMPLOYED.

As brucine possesses the properties of strychnine, but in a weak degree, it may be administered in the dose of one, two, and even three grains (gr. 0.82, 1.64 or 2.46 troy), without fear of accident, under the same circumstances in which the preparations of nux vomica are indicated. It is even probable that the dose might be carried much higher, but it is better to use the remedy with a wise caution.

It is for experience to decide whether this new substance should be preserved as a medicine or rejected.

POSOLOGICAL TABLE.

ATROPINE. Dose not determined.

BRUCINE. From one to three grains.

CINCHONINE. From eight to twenty grains.

Syrup of Cinchonine—from one to two table-spoonsful.

Wine of Cinchonine — from four to twenty-four ounces or more in the twenty-four hours.

Tincture of — from two drachms to six.

DATURINE. Dose not determined.

DELPHINE. Dose not determined.

EMETINE. From a quarter of a grain to four grains or more.

Mixture of Emetine — a dessert spoonful every hour until vomiting is induced.

Pectoral Lozenges of Emetine — one every hour, or otherwise.

Emetic Lozenges of Emetine — three or four.

Syrup of Emetine — from ℥ss. to ℥j. or more.

EMETINE PURIFIED — from one sixteenth of a grain to two grains.

Pectoral Lozenges of pure Emetine — one every hour.

Emetic Mixture of pure Emetine—a dessert spoonful every quarter of an hour until vomiting is induced.

Syrup of pure Emetine — from two to four teaspoonsful.

GENTIANINE — from two grains to four or more.

Tincture of Gentianine — from ʒss. to ʒij. or more.

Syrup of Gentianine—from ʒj. to ʒiij.

HYDRO-CYANIC ACID [*Medicinal Acid of Magendie*] — from a quarter of a drop to two drops.

Mixture of Hydro-cyanic Acid — a dessert spoonful.

Syrup of Hydro-cyanic Acid — from ʒj. to ʒij.

HYOSCYAMINE. Dose not determined.

IODINE. From gr. j. to gr. iij.

Hydriodate of Potass. Ditto.

Ioduretted Hydriodate of Potass. Ditto.

Tincture of Iodine — from 10 to 20 drops.

Solution of Hydriodate of Potass. Ditto.

LUPULINE, *Preparations of* — Doses not yet established.

MORPHINE — from ⅛th to ¼th of a grain, or more.

Sulphate of Morphine — from ¼th of a grain to a grain.

Acetate of Morphine. Ditto.

Syrup of Acetate of Morphine — two to four teaspoonfuls.

Syrup of Sulphate of Morphine. Ditto.

Anodyne drops — from 6 to 24 drops.

Solution of Acetate of Morphine. Ditto.

NARCOTINE. Dose not yet established.

NUX VOMICA.

Alcoholic Extract of Nux vomica — gr. ss. to gr. v.

Tincture of Nux vomica — gtt. 5 to 30.

OPIUM.

Extract of Opium deprived of Narcotine — from gr. ss. to gr. ij.

Extract of Opium deprived of Morphine — from gr. ij. to gr. vi.

PICROTOXINE. Dose not yet established.

QUININE. From v. to x. grains.

Sulphate of Quinine—from j. to xxiv. grains in the 24 hours.

Syrup of Sulphate of Quinine — from one to two table-spoonfuls.

Wine of Quinine — same as *Wine of Cinchonine.*

Tincture of Quinine — from ʒij. to ʒvj.

STRYCHNINE — from $\frac{1}{12}$ to $\frac{1}{8}$ of a grain.

Pills of Strychnine — one or two.

Tincture of Strychnine — from 6 to 24 drops.

Mixture of Strychnine — a dessert spoonful, or f. ʒiv. to ℥j.

SOLANINE. Dose not yet established.

VERATRINE. From $\frac{1}{8}$ to $\frac{1}{2}$ a grain.

TABLES,

Shewing the Proportion of the active Ingredients in the various compound Medicines of the FORMULARY.*

CINCHONINE.

Syrup of Cinchonine contains one grain Fr. (gr. .82 Troy) of the sulphate of cinchonine in ℥ij. and 49 grains (℥ij. gr. 18 troy.)

Wine of Cinchonine contains one grain Fr. of the sulphate in one ounce and six drachms (℥j. 5 dr. 47 gr. troy.)

Tincture of Cinchonine contains one grain Fr. of the sulphate, in sixty-five (gr. 63.17 troy.)

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* The proportion between the weights and the measures of the various fluid preparations may be in some degree appreciated, by a reference to the following Table: in which the first column shews the weight, and the second the number of drops, in a measured drachm of several active fluids, under circumstances as nearly similar as possible, as ascertained by Mr. Shuttleworth.

	Grains.	*Drops.*
Distilled water	60	60
Fowler's arsenical solution	60¾	60
White wine	58¾	94
Ipecacuanha wine	59¾	84
Antimonial wine	59¾	84
Rectified spirits of wine	51½	151½
Proof spirit	55¼	140
Laudanum	59½	134
Tincture of digitalis	58	144

EMETINE.

Emetic Mixture of Emetine contains one grain Fr. of emetine in five drachms (4 dr. 55 gr. troy.)

Pectoral Lozenges of Emetine contain one grain Fr. of emetine in one drachm (gr. 59.07 troy.)

Emetic Lozenges of Emetine contain one grain Fr. of emetine in 37 grains (gr. 30.35 troy.)

Syrup of Emetine contains one grain Fr. of emetine in each ounce (7 dr. 52.58 gr. troy.)

PURE EMETINE.

Lozenges of pure Emetine contain one grain Fr. of pure emetine in each half ounce (3 dr. 56.28 gr. troy.)

Syrup of pure Emetine contains one grain Fr. of pure emetine in four ounces (3 oz. 7 dr. 30.24 gr. troy.)

GENTIANINE.

Tincture of Gentianine contains one grain Fr. of gentianine in one drachm and forty-nine grains (ʒj. gr. 39.6 troy.)

Syrup of Gentianine contains one grain Fr. of gentianine in about an ounce (7 dr. 52.5 gr. troy.)

HYDRO-CYANIC ACID.

Mixture of Hydro-cyanic Acid contains one grain Fr. of M. Magendie's *medicinal prussic acid* in one drachm and sixty-eight grains (ʒj. 55 gr. troy.)

Pectoral Mixture of Hydro-cyanic Acid contains one grain of the *medicinal acid* in one drachm and forty-five grains (gr. 95.98 troy.)

Hydro-cyanic Syrup contains one grain Fr. of the acid in one drachm and fifty-seven grains (ʒj. gr. 46 troy.)

Hydro-cyanic Lotion contains one fluid drachm of Scheele's acid in f. ℥iij.

IODINE.

Tincture of Iodine contains one grain Fr. of iodine in about 13 gr. Fr. (gr. 10.66 troy), or about 30 drops.[a]

Solution of Hydriodate of Potass contains one grain Fr. of the hydriodate in about seventeen drops of the liquid.

Ointment of Hydriodate of Potass contains one grain Fr. of the hydriodate in 24 grains troy (gr. 19.68 troy.)

LUPULINE.

Powder of Lupuline contains one part of lupuline in three.

Tincture of Lupuline is made with one part of lupuline to three of alcohol.

Syrup of Lupuline is formed of one part of the alcoholic tincture to seven of simple syrup; and consequently contains one part of the lupuline in thirty-two of the syrup.

MORPHINE.

Syrup of Acetate of Morphine contains one grain Fr. of the acetate in ℥iv. (3 oz. 7 dr. 30 gr. troy.)

Syrup of Sulphate of Morphine contains one grain Fr. of the sulphate in four ounces Fr.

Anodyne Drops contain one grain Fr. of the acetate of morphine in about 42 gr. (gr. 34.45 troy.)

Solution of Acetate of Morphine contains one grain troy of the acetate in ʒj. troy.

NUX VOMICA.

Tincture of Nux vomica contains one grain Fr. of the

[a] M. Magendie says 20 drops.

alcoholic extract in two drachms and forty-nine grains, (ʒij. gr. 38 troy.)

QUININE.

Syrup of Sulphate of Quinine contains one grain Fr. of the sulphate in five drachms (4 dr. 55.3 troy.)

Wine of Quinine contains one grain of the sulphate in two ounces and five drachms (2 oz. 4 dr. 30 gr. troy.)

Tincture of Quinine contains one grain Fr. of the sulphate in one drachm and 25 grains (gr. 79.57 troy.)

STRYCHNINE.

Pills of Strychnine contain one grain Fr. of strychnine in thirty-six grains (gr. 29.5 troy.)

Tincture of Strychnine contains one grain Fr. of strychnine in ʒij. gr. 49 (ʒij. 38 gr. troy.)

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APPENDIX

TO

THE FORMULARY

FOR THE

PREPARATION AND MODE OF EMPLOYING

SEVERAL

NEW REMEDIES;

CONTAINING THE

PHARMACEUTICAL AND THERAPEUTICAL PROPERTIES

OF THE HYDRIODATES OF POTASS AND SODA, THE IODURET OF MERCURY, THE CYANURETS OF POTASSIUM AND ZINC, THE OIL OF THE CROTON TIGLIUM, PIPERINE, JALAPINE, ETC.

By ROBLEY DUNGLISON, M.D.

F.R.S. NANCY; F.L.S. PARIS; &c.

Translated from the French of the Fourth Edition of MAGENDIE'S *"Formulaire," published in July.*

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APPENDIX

TO

THE FORMULARY, &c.

MORPHINA.—(P. 3.)

M. J. Fenuglio has recently published some remarks on the action of the meconic acid and its combinations on man and other animals, from which it would seem that it does not possess that febrifuge property which has by some been ascribed to it.—(*Annal. Univers. di Medicin.*, Oct. and Nov. 1823.)

ULTIMATE ELEMENTS OF MORPHINE.—(P. 8.)

M. Bussy, chemical operator at the *Ecole de Pharmacie*, has given a good analysis of morphine. He found that it contained azote, which had not been suspected by Thomson, and a much larger proportion of carbon. MM. Dumas

and Pelletier[a] have also published two analyses of morphine: the first specimen had been extracted from opium, according to M. Robiquet's process; the second from the sulphate of morphine by potass. The mean result approximated very nearly to that of M. Bussy.

M. Bussy's Analysis.		*Analysis by MM. Dumas and Pelletier.*	
Carbon	69.	Carbon	72.02
Hydrogen	6.5	Hydrogen	7.61
Azote	4.5	Azote	5.53
Oxygen	20.	Oxygen	14.84
Morphine	100.		100.

MORPHINÆ ACETAS.—(P. 9.)

The acetate may also be prepared by dissolving morphine in alcohol, and filtering the solution. It must then be saturated with acetic acid, and evaporated to dryness: the acetate, however, thus obtained is not exactly acetate of morphine, but rather acetate containing an excess of base, as may be perceived by mixing it with water: a part of the acetate is not dissolved, the morphine not being entirely saturated with acetic acid.

[a] *Recherches sur la Composition Elémentaire et sur quelques Propriétés Caracteristiques des Bases Salifiables Organiques.* Par MM. Dumas et Pelletier.

The acetate may, however, be obtained in a state of crystallization: for this purpose, when the morphine has been dissolved in alcohol and saturated with acetic acid, it must be filtered and suffered to evaporate slowly in an evaporating dish, covered with gauze; the salt crystallizes, and is deposited on the sides of the dish in the form of ramifications.

MORPHINÆ SULPHAS.—(P. 10.)

The sulphate of morphine may also be obtained by dissolving morphine in alcohol, saturating it with sulphuric acid and evaporating it. The sulphate is obtained crystallized in silky tufts.

M. Pelletier is of opinion that the sulphate of morphine should be preferred to the acetate, because it is possible to obtain it constantly alike; this is not the case with the latter salt, which is frequently mixed with narcotine, from its being more soluble in alcohol than morphine. It happens, also, that the acetate is partly decomposed by the drying to which it is obliged to be subjected, in order that it may keep. As the sulphate is always obtained by crystallization, a subsulphate can never form; whilst a subacetate may be the result when evaporation is employed for procuring the acetate.

MODE OF EMPLOYING THE SALTS OF MORPHINE. — (P. 14.)

M. Magendie affirms, that he has employed the salts of morphine both in hospital and private practice to the extent of four grains (3·24 gr. troy) a day, without any sort of inconvenience being induced. It is necessary, he observes, to abstract considerably from the ideas which were at first formed respecting the activity of this medicine, and especially to avoid considering it as a very subtile poison; on the contrary, it is now indubitable, he asserts, that, in order to become deleterious, it must be administered in a high dose, and not excite vomiting. The latter circumstance must be of very rare occurrence.

NARCOTINA.—(P. 15.)

CHEMICAL PROPERTIES OF NARCOTINE.—(P. 16.)

MM. Dumas and Pelletier have found narcotine to be composed of—

Carbon	68.88
Azote	7.21
Hydrogen	5.91
Oxygen	18.00
Narcotine	100.

MODE OF PREPARING THE EXTRACT OF OPIUM DEPRIVED OF NARCOTINE.—(P. 20.)

M. Dublanc, jun., feeling convinced, from repeated experiments, that opium treated in the cold with ether until the ether had no longer any action upon it, afforded an extract which, when again treated with heat by the same agent, still gave sensible traces of narcotine, has modified M. Robiquet's process as follows:—

Take of extract of opium, prepared in the cold, 9 oz. 5 drs. 10 grs.; dissolve it in 4 oz. 6 drs. of distilled water: pour this solution into a retort, and add 5 lbs. 4 oz. 2 drs. of pure

ether: a gentle heat must now be applied, and after about a fourth part of the ether has passed over, the ether which swims above the extract in the retort must be speedily poured off. The ether obtained by the distillation serves to wash the extract whilst yet warm; and after these processes it should be evaporated to a proper consistence. For fear that the ether poured off from the extract after distillation may have left in the mass a little narcotine, the extract must be dissolved in distilled water, and filtered: on the filter some small crystals of narcotine will be found mixed with an extractive pulverulent matter, insoluble in the small quantity of water employed for treating the extract: evaporate the solution until the extract assumes its ordinary form. When thus obtained, the extract of opium may be regarded as entirely deprived of narcotine. It powerfully attracts humidity from the atmosphere, and readily dissolves in water, which it colours much less than the common extract, without depositing in it any extraneous matter. A digester may also be used for obtaining by ether the pure extract of opium.

The above extract may be employed like the aqueous extract of the shops.

IODINA.—(P. 23.)

PREPARATION OF THE HYDRIODATES OF POTASS AND SODA.—(P. 27.)

MM. Baup[b] and Caillot,[c] the former a pharmacien at Vévay, the latter at Paris, have each invented a similar process for obtaining the hydriodate of potass, by means of the hydriodate of iron, of which the following is a description:—

Introduce into a flask or matrass one part of iodine, and three or four of water; add by degrees and at intervals an excess of pure iron filings—a half part for example. The combination takes place immediately; much heat is disengaged, the iodine disappears, and the liquid becomes of a deep red colour. During this brisk reaction an iodureted hydriodate is formed: by heating it slightly, and agitating it for a moment whilst still hot, it is converted into simple hydriodate of iron. The action is known to be terminated by the almost entire decoloration of the liquid; but more certainly, when white paper is no longer tinged red by it.

[b] *Naturwiz. Anzeigir*, 1821.

[c] *Journal de Pharmacie*, Octobre, 1822.

The solution must be filtered, diluted with some parts of water, and raised, in a sand bath, in an evaporating dish or matrass, to a point near that of ebullition; the iron should then be precipitated by means of the pure carbonate or subcarbonate of potass. This part of the operation requires some attention, in order that an excess of potass be not added; which might, however, be separated by repeated crystallization, or be saturated with the hydriodic acid. After having filtered in order to separate the ferruginous deposit, and well washed it, we must proceed to the evaporation of the filtered liquor, beginning with the washings. The salt may be made to crystallize by refrigeration or evaporation: in the latter case, the concentrated solution of the hydriodate of potass should be placed, not in a stove, because the salt would mount up the sides of the vessel and subtract all the liquid from it, but upon a very gentle fire, where the edges of the vessel, being less heated than the bottom, may condense a little of the vapour which arises, and thus prevent the ascension of the salt. By degrees the crystals are deposited: when they fill nearly the whole of the space occupied by the liquid, it must be suffered to cool, and the mother-waters be drained off and again evaporated, to extract more salt from them: finally, the crystals must be entirely dried in a stove or on the

fire, where they undergo a slight decrepitation.

In order to procure this salt perfectly pure, it should be subjected to fresh crystallization, especially if potass has been added in excess. If the iron employed contained a little copper, it will be sufficient to pass into the mother-waters some bubbles of sulphuretted hydrogen, and to filter before proceeding to fresh crystallizations.

CHEMICAL PROPERTIES OF THE HYDRIODATE OF POTASS.

The hydriodate of potass (ioduret of potassium) commonly crystallizes in cubes; but by careful evaporation the crystals assume a hopper-shape, more or less open. These crystals are almost always opaque or of a milky white. By slow cooling, M. Baup obtained from a slightly concentrated solution long quadrangular prisms, and also short prisms terminated by a pyramid with four facets.

The solubility of the ioduret of potassium at 18° Therm. Centigr. (65° Fah.) has been determined by M. Gay-Lussac: 100 parts of water at that temperature dissolve 143 of the ioduret. M. Baup found that the same quantity of water at 12°.5 (55° Fah.) dissolved 136, and at 16° (61° Fah.) 141 parts.

Five parts of alcohol S. G. .85 at 12°.5 (55° Fah.), and 39 to 40 parts of absolute alcohol at the same temperature, are required to dissolve one of the ioduret. It dissolves more readily in both one and the other by the aid of heat.

POTASSÆ HYDRIODAS IODURETA.

Ioduretted Hydriodate of Potass.

M. Baup found that the *ioduretted* hydriodates are combinations of fixed and determinate proportions; so that the solution of hydriodate of soda or of potass, which is known to be capable of still dissolving iodine, can, under any circumstance, combine with a quantity of iodine equal to that which itself contains (nearly three-fourths of its weight, or as 76·5 to 100).

The *ioduretted* hydriodate of potass only has been yet employed in medicine, and commonly in solution in water: the simple hydriodate is, however, preferable.

CASES IN WHICH THE PREPARATIONS OF IODINE MAY BE EMPLOYED.—(P. 32.)

M. Brera has shewn, by cases, the beneficial properties of iodine in suppressed menstruation: his observations have also been con-

firmed by other physicians. M. Brera appears to have administered the preparations of iodine in a greater variety of diseases than M. Coindet. In addition to cases of bronchocele and menstrual suppression cured by iodine, he has given several histories of glandular enlargements, tabes mesenterica, chronic dysentery, hæmoptysis succeeding to suppression of the menses, phthisis laryngea, leucorrhœa, and syphilitic swellings, the cure of which he attributes to that medicine. M. Magendie, however, considers it not improbable that M. Brera frequently associates other preparations with those of iodine, whilst he ascribes the whole efficacy to the latter.

Iodine has also been lately used for the treatment of syphilitic buboes and for gonorrhœa.

M. Magendie considers that the accidents resulting from the administration of iodine in other countries than France, may have arisen from no allowance having been made for the difference between the *poids de marc*, which is used in that country; the Nuremberg, which is used in Switzerland and Germany; and the Troy, in England: a difference of one-fifth in the strength being the result, if the two last are used instead of the first. M. Magendie cannot, however, have seen the English translation of his work, or he would have found that the

difference between the weights has been clearly appreciated.

Mode of prescribing Iodine. — *(p. 35.)*

ÆTHER SULPHURICUS IODURETUS.

Iodureted Sulphuric Ether.

Take of

Sulphuric Ether.....1 gros (59 gr. troy.)
Pure Iodine .....6 grains (4.92 gr. troy.)

Thirty drops contain one grain (.82 gr. troy) of iodine. Patients do not easily bear more than ten drops at once.

HYDRARGYRI IODURETUM. — (P. 41.)

Ioduret of Mercury.

The ioduret of mercury has been recently employed against syphilis; as, however, the medicinal virtues of this new compound have not yet been clearly established, we shall merely indicate its mode of preparation and the different forms under which it has been administered.

MODE OF PREPARING THE PROTO-IODURET OF MERCURY.

Take 100 parts of the nitrate of the protoxide of mercury crystallized, and dissolve it in 400 parts of water. Pour into the filtered liquid a solution of hydriodate of potass, and add it until a precipitate is no longer thrown down. A greenish-yellow precipitate is thus obtained, which is pulverulent: throw it upon a filter: wash it carefully with distilled water, until the fluid which passes through no longer yields a black precipitate by potass: dry it, and preserve it in a vessel closed and kept from the rays of light. According to Thomson, 162 parts of the proto-ioduret contain 62 of iodine and 100 of mercury, or 2.5 of mercury and 1.56 of iodine.

MODE OF PREPARING THE DEUTO-IODURET.

The deuto-ioduret is prepared with the deuto-chloruret of mercury (corrosive sublimate); 70 parts of this chloruret to 100 parts of the ioduret of potassium. Each compound being dissolved separately in a sufficient quantity of distilled water, filter the two solutions, and unite them in small portions: a red powder is immediately precipitated, which must be

collected upon a filter and washed with distilled water with the greatest care, until the fluid which passes through the filter has no more taste.

The precipitate must be dried, reduced into powder, and kept in a bottle *à l'abri* from the rays of light. The deuto-ioduret contains 2.5 of mercury and 3.12 of iodine.

Mode of employing the Ioduret of Mercury.

UNGUENTUM HYDRARGYRI PROTO-IODURETI.

Ointment of Proto-Ioduret of Mercury.

Take of

Proto-Ioduret of Mercury . . . 20 grains (16.40 gr. troy.)
Hog's Lard . . . . . 1½ oz. (11 dr. 48 gr. troy.)
Mix.

This ointment has been extolled in the treatment of inveterate venereal ulcers, of which it is said to accelerate the cicatrization.

UNGUENTUM HYDRARGYRI DEUTO-IODURETI.

Ointment of Deuto-Ioduret of Mercury.

Take of

Deuto-Ioduret of Mercury . . 20 grains (16.40 gr. troy.)
Hog's Lard . . . . . 1½ oz. (11 dr. 48 gr. troy.)

This ointment, which is more active than the

preceding, is employed in the same manner: a very small quantity only should be put upon the lint applied to the ulcers.

TINCTURA HYDRARGYRI DEUTO-IODURETI.

Tincture of Deuto-Ioduret of Mercury.

Take of

Deuto-Ioduret of Mercury··20 grains (16.4 gr. troy.)
Alcohol at 36° (.837)·····1½ oz. (11 dr. 48 gr. troy.)
Mix.

Twenty-six drops of this solution nearly correspond with an eighth of a grain of the deuto-ioduret of mercury: it may be given in the dose of 10, 15, or 20 drops, in a glassful of distilled water, common water readily decomposing it.

It has been said to have succeeded in scrofulous affections complicated with syphilis.

ETHER SULPHURICUS CUM HYDRARGYRI PROTO-IODURETO VEL DEUTO-IODURETO.

Sulphuric Ether, with Proto—or Deuto-Ioduret of Mercury.

Take of

Sulphuric Ether·····1½ oz. (11 dr. 48 gr. troy.)
Proto—or Deuto-Ioduret of
Mercury·····20 gr. (16.48 gr. troy.)

This preparation, which is more active than the preceding, should be given in smaller doses.

PILULÆ HYDRARGYRI PROTO-IODURETI VEL DEUTO-IODURETI.

Pills of Proto—or Deuto-Ioduret of Mercury.

Take of

Proto—or Deuto-Ioduret of Mercury 1 gr. (.82 gr. troy.)
Extract of Juniper ..... 12 gr. (9.84gr. troy.
Liquorice Powder ..... q. s.

To make eight pills, of which two may be taken first thing in the morning and two in the evening. The dose may be afterwards carried as far as four in the morning and four in the evening.

EXTRACTUM NUCIS VOMICÆ RESINOSUM. — (P. 42.)

CASES IN WHICH THE ALCOHOLIC EXTRACT OF THE NUX VOMICA MAY BE EMPLOYED. — (P. 47.)

M. MAGENDIE has recently employed this medicine with advantage in several cases of partial atrophy of the upper and lower limbs.

TINCTURÆ NUCIS VOMICÆ. — (P. 49.)

This tincture may also be employed as an embrocation to any part in a state of paralysis or atrophy. It is now employed in this manner amongst the Italians.

STRYCHNINA. — (P. 50.)

MODE OF PREPARING STRYCHNINE. — (P. 51.)

When strychnine is prepared after the method detailed at p. 51, it is *not* "obtained in a state of purity," but consists of a mixture of strychnine, brucine, and colouring matter. By macerating the whole in a small quantity of weak alcohol, the brucine and colouring matter are speedily dissolved, and the strychnine remains in a pulverulent form: this must be treated with boiling rectified alcohol, which dissolves it, and the alcohol be evaporated, when the strychnine will crystallize. A small quantity of the alcoholic mother-water should be left to take up any remains of brucine. On repeating the crystallization of the strychnine, it is obtained still more pure.

It is, however, almost impossible, with the nux vomica, to have a strychnine incapable of being reddened by the nitric acid, which is the characteristic mark of its purity. The strychnine obtained from St. Ignatius's bean approaches this result, but it is easily obtainable from the *upas tieuté*.

CHEMICAL PROPERTIES OF STRYCHNINE.—
(P. 55.)

According to MM. Dumas and Pelletier, the mean between two analyses of strychnine gave in one hundred parts —

Carbon	78.22
Azote	8.92
Hydrogen	6.54
Oxygen	6.38
Strychnine	100.06

EMETINA PURIFICATA. — (P. 68.)

CHEMICAL PROPERTIES OF PURE EMETINE. — (P. 69.)

From the circumstance of pure emetine being precipitable from its combinations by the gall-nut, the latter would be the most proper antidote in cases of poisoning by the former.

MM. Dumas and Pelletier have found the composition of pure emetine obtained from the *cæphalis emetica* to be as follows: —

Carbon	64.57
Azote	4.
Hydrogen	7.77
Oxygen	22.95
Emetine	99.29

CINCHONINA — (P. 74.)

CHEMICAL PROPERTIES OF CINCHONINE. — (P. 79.)

MM. Dumas and Pelletier found cinchonine to be composed as follows : —

Carbon	76.97
Azote	9.02
Hydrogen	6.22
Oxygen	7.97
Cinchonine	100.18

QUININA.—(P. 74.)

CHEMICAL PROPERTIES OF QUININE.—(P. 80.)

MM. Dumas and Pelletier have succeeded in communicating to quinine a crystalline texture, by causing it to undergo igneous fusion *in vacuo*, and suffering it to cool in a slow manner. In this case, instead of preserving its resinous aspect and transparency, it contracts, becomes opaque, and forms at its surface centres of crystallization, which radiate on all sides, and produce a sort of mohair appearance: the fracture of the mass is crystalline.

Quinine, when melted, becomes idio-electric; and acquires the resinous electricity with much intensity when rubbed with a piece of cloth.

MM. Dumas and Pelletier have obtained for the mean composition of quinine the following results:—

Carbon	75.38
Azote	8.72
Hydrogen	6.15
Oxygen	9.85
Quinine	100.10

PROPERTIES OF THE SULPHATE OF QUININE. — (P. 81.)

The sulphate of quinine possesses a very remarkable property, observed for the first time by M. Callaud d'Annecy.

This salt, when exposed to the temperature of 100° (212° Fah.), becomes luminous, especially when subjected to slight friction. MM. Dumas and Pelletier exposed about two or three ounces Fr. of the sulphate, inclosed in a glass flask, which they kept in a sand-bath for half an hour, to the temperature of boiling water, when it exhibited, on friction, a tolerably intense, white light. On passing through the cork of the flask a metallic rod, ending in a point at the internal extremity and by a ball at the opposite one, and applying it to the ball of the rod of a Voltaic electroscope, shaking the flask before each contact, these gentlemen obtained the greatest separation of which the rods of the electroscope are susceptible: the electricity was always vitreous. The sulphate of cinchonine possesses the same phosphorescent property, but in a less degree, and the electric faculty in the same ratio.

VERATRINA.—(P. 90.)

CHEMICAL PROPERTIES OF VERATRINE.—(P. 94.)

MM. DUMAS and Pelletier have made three analyses of veratrine, obtained from the *veratrum sabadilla*. The results of these various analyses differed but little from each other:

Carbon	66.75
Azote	5.04
Hydrogen	8.54
Oxygen	19.60
Veratrine	99.93

ACIDUM HYDROCYANICUM.—(P. 102.)

CASES IN WHICH IT MAY BE PRESCRIBED. (P. 108.)

Dr. Frisch, Physician at Nyborg in Denmark, succeeded in relieving most excruciating pains, which had resisted every antispasmodic, and were occasioned by a cancer of the breast, by washing the surface of the cancerous ulcer with the diluted medicinal prussic acid. He has also employed this medicine usefully in several cases of phthisis.

MODE OF PRESCRIBING IT.—(P. 108.)

The *medicinal prussic acid* may be also formed by diluting the hydrocyanic acid with six times its volume of alcohol: in this manner it better preserves its active properties, and evaporates much less speedily than when mixed with water. It has recently been proposed to employ a more concentrated prussic acid; for example, one consisting of three parts of water, and one of acid: but it does not seem that this method can have any advantages over that which at the present day is generally adopted.

LIQUOR POTASSII CYANURETI.—(p. 114.)

Solution of pure Cyanuret of Potassium as a Succedaneum for the Prussic Acid.

The difference of the results obtained by those physicians who have employed the prussic acid, has been attributed to that medicine not being always alike, in consequence of its great volatility, and the facility with which its elements separate: but the slight modification, in the preparation of the medicinal hydrocyanic which has been proposed, will in a great measure remedy that inconvenience.

MM. Robiquet and Villermé have, however, conceived that cyanuret of potassium might be advantageously substituted for it, the effects of which on the animal economy are the same.

MODE OF PREPARATION.

The process recommended by M. Robiquet consists in exposing to long-continued heat the ferruginous prussiate of potass. Thus the cyanuret of iron is completely decomposed, and that of the potassium remains untouched. The residuum of this strong calcination constitutes a solid, blackish, lamellar mass, which consists entirely of the cyanuret of potassium, soiled by

the iron and the charcoal belonging to the cyanuret of iron. This mass is then dissolved in water: when the iron and charcoal are deposited, whilst the cyanuret of potassium dissolves, and is transformed into hydrocyanate of potass.

When the operation has been well conducted, the solution is perfectly colourless, and retains no portion of iron. The cyanuret of potassium, when well prepared, is very pure, white, and transparent: it may be melted on the fire without becoming disorganized, and keeps for an indefinite period, provided it be preserved from the contact of humidity.

ACTION OF THE CYANURET OF POTASSIUM, AND OF THE HYDROCYANATE OF POTASS, ON ANIMALS AND ON MAN.

MM. Robiquet and Villermé performed some experiments on animals, in the presence of M. Magendie.

The action of the cyanuret of potassium was such, that with a tenth of a grain (gr. .082 troy) of this salt, a cock-linnet was killed in the space of a minute: less than a grain (than gr. .82 troy) killed a guinea-pig in two or three minutes.

Of the hydrocyanate of potass, a small drop containing only the 100th part of a grain

(gr. .0082 troy) of the cyanuret in solution, caused a cock-linnet to drop down dead at the end of half a minute. A half drachm (gr. 29.5 troy) containing five grains (gr. 4.1 troy) of the cyanuret, killed a dog of large size in a quarter of an hour. The symptoms of poisoning were similar to those occasioned by the hydrocyanic acid. There has not hitherto been an opportunity of studying on man the symptoms occasioned by this substance.

MODE OF EMPLOYING IT.

The cyanuret of potassium should be dissolved in eight times its weight of distilled water, when it becomes transformed into hydrocyanate of potass. To the cyanuret mixed with water in this proportion, might be applied the name of the *medicinal hydrocyanate of potass.*

This hydrocyanate may thus be administered without danger in the same doses as the medicinal prussic acid, and may enter into the same preparations as those mentioned under that head.[a] It is, moreover, possible to render it wholly independent of the action of the small portion of alkali contained in the cyanuret, by adding a few drops of some vegetable acid, or by prescribing it with an acid syrup:

[a] *Formulary*, p. 108.

which would be also attended with the advantage of rendering the prussic acid *plus à nu*.

If the cyanuret of potassium be put into a mixture in place of the hydrocyanate of potass, it should be begun with in the dose of a quarter of a grain (gr. .205 troy), and gradually augmented to a grain (gr. .82 troy), a dose which has already been exceeded by some physicians.

ZINCI CYANURETUM.

Cyanuret of Zinc.

This cyanuret has been lately employed in Germany in place of the hydrocyanic acid. It has also been said to possess somewhat marked vermifuge properties. Until experience shall, however, confirm or negative these commendations, we shall give here the mode of preparation, which there is every reason to suppose has been followed in Germany, in order that some experiments may be made with it.

MODE OF PREPARATION.

We are yet ignorant of the precise process employed by the Germans for the preparation of the cyanuret of zinc. M. Pelletier has made

some researches for the purpose of obtaining this combination. The means which have succeeded with him, consist in precipitating the sulphate of zinc by the hydrocyanate of potass: a triple hydrocyanate of zinc is formed: this hydrocyanate, when well dried and calcined to a dark red, is converted into cyanuret of zinc. It is always mixed with cyanuret of potassium. M. Magendie thinks it probable that this is the preparation extolled by the Germans, but there is nothing to prove it directly.

MODE OF EMPLOYMENT.

The cyanuret of zinc may be employed in the same doses as the cyanuret of potassium. It should be commenced in the dose of a quarter of a grain (gr. .205 troy). This may be gradually increased to a grain and a half (gr. 1.23 troy), in a mixture to be taken by spoonfuls. These trials should, however, be carried on with much circumspection.

BRUCINA.—(P. 140.)

In the St. Ignatius's bean, and in the upas, brucine enjoys the same *rôle* as regards strychnine, which cinchonine does to quinine in the cinchonas: the most active cinchonas contain the most quinine, whilst St. Ignatius's bean and the upas, which are much more active than the nux vomica, contain little brucine and much strychnine. The strychnine is almost pure in the upas.

PROPERTIES OF BRUCINE.—(P. 141.)

Crystallized brucine is a true hydrate; its affinity for water is very considerable, whilst pure strychnine is not susceptible of passing into the state of a hydrate. Brucine loses by fusion a considerable quantity of water.

200 parts of brucine crystallized in water. yield of

Residuum	163 parts.
Water	37
	200

161 parts of brucine, crystallized in alcohol, yield of

Residuum	134 parts.
Water	27
	161

Which establishes for the constitution of the hydrate, taking the mean of these two results,

Brucine	100 parts.
Water	21.65

Two analyses of brucine, extracted from the false angustura, in the state of perfect purity, and melted *in vacuo*, have given as a medium composition.

Carbon	75.04
Azote	7.22
Hydrogen	6.52
Oxygen	11.21
Brucine	100

CASES IN WHICH BRUCINE MIGHT BE EMPLOYED. — (P. 143.)

M. Magendie has administered brucine with success in two cases of atrophy, the one of the arm and the other of the leg. The patients took in the day six pills, of an eighth of a grain each (gr. .102 troy).

M. Magendie has also added the following new remedies : —

OLEUM CROTONIS TIGLII—(P. 143.)

Oil of Croton.

This oil is obtained from the *croton tiglium*, a shrub of the family *euphorbiaceæ*, which grows in the East Indies. It is cultivated at Malabar, Ceylon, and the Moluccas, for the sake of its medicinal properties. Centuries ago (in 1630) the oil of croton was introduced into Europe, and was employed internally with success by several physicians. In 1632, Artus Gyselius extolled it in dropsy. In the *Herbarium Amboinense* of Rumphius, published at Amsterdam, in 1750, by Burmann, a description of the croton is contained; the seeds of which, says the author, yield on expression, an oil which, when taken in the dose of one drop in Canary wine, was at that time a common purgative. The medicine had, however, entirely fallen into neglect in Europe, when Dr. Conwell, a physician in the English East India Company's service at Madras, recalled attention to it. It is generally employed in India, and has been lately introduced into England.

MODE OF PREPARATION.

The mode of preparing the oil of croton is not known: it appears, however, to be commonly obtained by expression or boiling. Its preparation has not yet been attempted in France, from the difficulty experienced in procuring the seeds of the *croton tiglium*. On digesting in sulphuric ether 100 parts of the bruised kernels, placing the whole on a filter, carefully covered during the whole continuance of the filtration, and washing the residuum with a sufficient quantity of ether, Dr. Nimmo of Glasgow found that there remained forty parts, and that sixty had been dissolved.

By this process, from 300 grains of the seeds (from which 108 grains must be deducted for the envelope, when 192 grains of the kernels will remain) he obtained two drachms of an oil which had the taste and medicinal properties of the common oil of croton.

An alcoholic solution may also be prepared, either by pouring alcohol upon the seeds, or upon the oil itself: but Dr. Conwell does not indicate, in the thesis which he sustained at the Faculty of Paris, the proportions in which this solution, which enjoys the same properties as the oils, should be made: it seems that that which he prepared was much less active

than the oil, for he administered it in the dose of half a drachm. According to Dr. Nimmo, the activity of the oil of croton would seem to be owing to an acrid resinous principle, soluble in ether, alcohol, and the fixed and volatile oils. From the experiments of this physician, 100 parts of the kernels of the croton tiglium contain of

Acrid principle	27
Fixed oil	33
Farinaceous matter	40
	100

100 parts of the oil of croton contain

Acrid principle	45
Fixed oil	55
	100

MM. Vauquelin and Pelletier have made some experiments for the purpose of isolating the active principle of the oil of croton, but they have not succeeded in doing so.

ACTION OF THE OIL OF CROTON ON MAN AND ON ANIMALS.

The oil of croton is of an orange yellow colour, and of a marked smell, *sui generis:*

its taste is piquant, like that of cinnamon, and bears also a little resemblance to that of castor oil. When a drop is put upon the tongue, some moments afterwards a sensation of disagreeable heat is experienced, which extends as far as the fauces; this sensation continues for several minutes: in order to remove it, one or two spoonfuls of cold water should be taken; this should, however, be considered as an objection to the administration of the unmixed oil of croton. Dr. Conwell having sent me during the last year a certain quantity, I began to try its effects upon animals, when I found the oil to be purgative in an infinitely small dose, a drop or half a drop for example. In a larger quantity it became powerfully drastic, and occasioned violent inflammation of the intestinal canal, accompanied with repeated vomiting and purging.

When injected into the veins, it also excited, according to the dose, simple purgation, inflammation of the intestinal canal, or the death of the animals.

From these effects I did not hesitate to employ the oil of the croton tiglium as a medicine: I gave it at the Hôtel-Dieu at Paris to several patients, male and female, placed under my care, with very satisfactory results. One or two drops mixed with half an ounce of syrup purged mildly and copiously about fif-

teen patients, situated under different circumstances. The effects appeared so advantageous, that several pupils at the hospital desired to try the oil upon themselves, and several used it with advantage, and expressed their satisfaction at it.

I have several times employed in private practice the oil of the croton tiglium, and always without accidents.

Although I have not observed any inconvenience from it, I ought to say that Dr. Conwell has seen some individuals experience nausea and vomiting. When vomiting occurs, the purgative effect does not less take place.[d]

M. Conwell states, that the smell of the oil of croton several times respired over a bottle containing sixteen ounces, was sufficient to purge a young girl: but that an adult having made the same experiment, experienced only some nausea.

The effect of the oil of croton is very rapid, frequently supervening at the expiration of half an hour. Besides the alvine evacuations, the secretion of urine appears to be considerably augmented.

[d] In England the oil of croton has been repeatedly administered with advantage as a cathartic: it has, however, been observed in many cases to occasion those symptoms which M. Magendie remarks he has never witnessed. — R. D.

CASES IN WHICH IT MAY BE ADMINISTERED.

The oil of croton may be employed as a common purgative when there does not exist any irritation in the stomach or intestinal canal, and in old people under the same circumstances as veratrine: the oil should, however, be preferred, when the ordinary purgatives have been unsuccessfully administered, in apoplexies, and in dropsies, and, in short, where mechanical or other obstacles exist to the employment of a common medicine, and, particularly, where it is necessary that the effect should be rapid.

Doctor Ainslie, a physician at Madras, published, in 1813, in that town, a work on the materia medica, in which he recommends the external use of the oil of croton in rheumatic affections.

MODE OF EMPLOYMENT.

One, two, or three drops at the most, are commonly given in half an ounce of the syrup of gum arabic, or in any other syrup.

Dr. Conwell also recommends the employment of the following formula :

Take of

The alcoholic solution		½ drachm (gr. 29.5 troy).
Simple syrup,	} — aa	℥iij. (dr. 2 : gr. 57 troy).
Mucilage of gum arabic		

It has been already observed that Dr. Conwell has not indicated in what proportion the active principle entered into the alcoholic solution which he employed, so that it would be well, until we are better informed, to restrict ourselves to the use of the pure oil of croton : it is probable, however, that it was prepared by saturation.

This oil is also used for frictions round the umbilicus. According to Dr. Conwell, four drops applied in this way have produced a purgative effect. A slight eruption followed the employment of this method.

PIPERINA.

Piperine.

This substance was discovered in the black pepper[e] *(piper nigrum)* by M. Œrstaedt, who regarded it as a vegetable alkali.

M. Pelletier has since made an analysis of it, and proved that the piperine, the crystalline matter of the pepper, is not a vegetable alkali, but that it has a considerable analogy with the resins[f], and is of a peculiar nature.

This substance has lately been employed in Italy as a febrifuge. I have not yet been able to confirm, by my own experience, the properties which M. D. Meli[g] attributes to it. I shall, therefore, restrict myself to pointing out the process of which he makes use for obtaining the piperine, and the doses at which it may be employed, in order that new trials may be made of it.

[e] *Journal de Physique*, No. 2, 1820.

[f] *Examen Chimique du Poivre*, par J. Pelletier, 8vo. Paris.

[g] *Annali Univers. di Medicina*, t. xxvii. p. 161, and t. xxviii. p. 22.

MODE OF PREPARATION.

Let two pounds (2 lbs. 7 dr. 4 gr. troy) of the black pepper, bruised, be digested, at a gentle heat, in three pounds (3 lb. 11 oz. 2 dr. troy) of alcohol, at 36° (.837). This must afterwards be raised to ebullition; suffered to rest and grow cold; when it must be decanted, and the operation repeated with fresh alcohol. The two solutions must be mixed, and two pounds (2 lbs. 7 dr. 4 gr. troy) of distilled water, and three ounces (2 oz. 7 dr. 37 gr. troy) of hydrochloric acid be added to them. The liquor becomes troubled, and a precipitate of a deep grey is thrown down, which is in a great measure composed of fatty matter. The deposit being separated, somewhat beautiful crystals may be collected on the filter and sides of the vessel: these are the piperine. On adding water until this liquid is no longer rendered turbid, a fresh quantity is obtained. This process is the same as that pointed out by M. Pelletier. In a *mémoire* published by this gentleman, he states that he had also obtained the crystalline matter of the pepper by the following method:—After having exhausted the pepper by alcohol, and evaporated the alcoholic tinctures, a fatty or resinous matter is obtained; this must be subjected to the action of boiling water, which

must be repeated until it passes off colourless. Then, by dissolving this fatty matter thus purified by washing in alcohol, by the aid of heat, and leaving the solution to itself for some days, a multitude of crystals are obtained, which may be purified by solution in alcohol and ether, and by repeated crystallizations. The alcoholic mother waters, left to themselves, will afford fresh crystals. This crystalline matter is piperine.

The crystalline matter of the pepper presents itself under the form of prisms with four faces: two of which, parallel to each other, are evidently broader: the prism is terminated by an inclined surface. This substance is totally insoluble in cold water: boiling water dissolves a small quantity of it, which is precipitated on cooling.

It is very soluble in alcohol, less so in ether, and more so in hot than in cold.

M. Pelletier finds that piperine bears much analogy with the resin of cubebs; which M. Vauquelin compares with the balsam of copaiba: the piperine in cubebs, however, does not possess any crystalline property.

CASES IN WHICH PIPERINE MAY BE ADMINISTERED.

According to M. Meli, piperine enjoys the same febrifuge properties as the alkalies of the

cinchonas. At the hospital at Ravenna he has cured several cases of fevers with it, and he even goes so far as to affirm that its action is more certain than that of the sulphate of quinine. Piperine ought to be employed in a much smaller dose than the sulphate of quinine. Intermittent fevers are the only diseases in which it has as yet been employed. It might also be used in gonorrhœa in place of the cubebs. According to M. Meli, the acrid oil of the pepper enjoys the same febrifuge virtues as the piperine, but in a less degree. This is doubtless owing to its always retaining a certain quantity of the crystalline matter.

[JALAPINA.

Jalapine.

Mr. Hume, Junior, of Long-acre, is said to have discovered a vegeto-alkaline principle in jalap, to which he proposes to give the above name. Of its action, however, on man or on animals we know nothing: we must consequently wait until experiments have been instituted to that effect. The following is the manner in which he procured it.

MODE OF PREPARATION.

Coarsely powdered jalap is macerated for twelve or fourteen days in strong acetic acid: a highly-coloured tincture is thus obtained, which, when filtered, is supersaturated with ammonia, and the mixture violently shaken: a sabulous deposit rapidly falls, and a few crystals form on the sides of the vessel. The deposit and crystals are collected and washed with distilled water, again dissolved in a small quantity of concentrated acetic acid, and reprecipitated by ammonia added in excess, which throws down the jalapine in small, white, acicular crystals.

CHEMICAL PROPERTIES OF JALAPINE.

Jalapine is without any perceptible smell or taste, and seems to be heavier than morphina, quinina, or other substances of this class; it is scarcely soluble in cold water, and only to a small extent in hot; ether has no effect upon it: alcohol is its proper solvent. Very little trouble is requisite to purify jalapine from extractive or colouring matter, for which it appears to have but a slight affinity.

Mr. Hume considers that an ounce of jalap will, on careful treatment, afford about five grains of this substance.]

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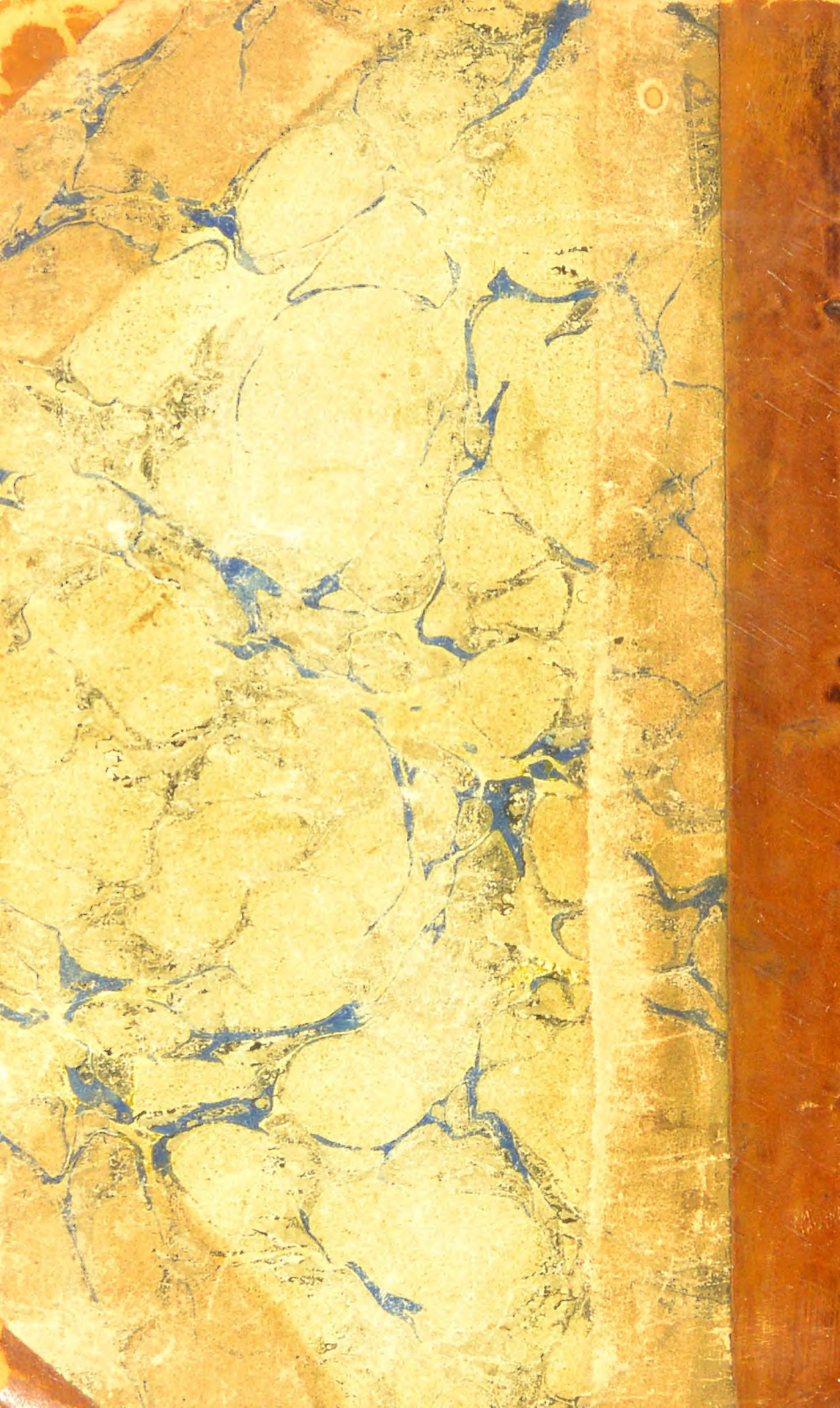
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